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## Public participation in decision making, perceived procedural fairness and public acceptability of renewable energy projects

Lu Liu\*, Thijs Bouman, Goda Perlaviciute, Linda Steg

University of Groningen, Faculty of Behavioural and Social Sciences, Department of Psychology, Grote Kruisstraat 2/1, 9712 TS Groningen, the Netherlands



### A B S T R A C T

Public participation in decision making has been widely advocated by scholars and practitioners as a remedy for public resistance against sustainable energy projects. Yet, it is unclear via which processes public participation in decision making may affect public acceptability of energy projects. We hypothesize that public participation in decision making is likely to increase project acceptability when it enhances perceived procedural fairness. Moreover, we hypothesize that perceived procedural fairness is higher when people can participate and influence major rather than only minor aspects of the project. We conducted three experimental studies in the Netherlands to test these hypotheses, with renewable energy projects as a case in point. As expected, public participation in decision making increased perceived procedural fairness, particularly when people could influence major aspects of the project. In turn, higher perceived procedural fairness enhanced public acceptability of the projects. Interestingly, when controlling for perceived procedural fairness, public participation in decision making had no effect (Study 2) and even a negative effect (Study 1 and 3) on project acceptability, particularly when people could influence major aspects. We conclude that public participation in decision making can enhance project acceptability if people can influence major aspects and perceive the decision making as fair. Next, our findings point out that there may be other processes instigated by public participation in decision making that can influence project acceptability. We discuss the theoretical and practical implications of our findings.

### 1. Introduction

To mitigate climate change and its negative impacts, global CO<sub>2</sub> emissions need to be reduced [1]. Transitioning from energy production based on fossil fuels (e.g., coal, oil and gas) to energy production based on renewable energy sources (e.g., solar and wind energy) could significantly contribute to the reduction of global CO<sub>2</sub> emissions [2]. The success of such a transition strongly depends on public acceptability of renewable energy projects [3–7] since renewable energy projects may be halted or canceled if there is strong public resistance [8–10]. Hence, an important question is which factors affect public acceptability of renewable energy projects.

We define public acceptability of renewable energy projects as the extent to which the public evaluates those projects (un)favorably; from now on, we refer to this as “project acceptability”. It has been found that project acceptability is typically low when traditional top-down decide-announce-defend approaches are followed with little opportunity for the public to influence decision making [11]. On the contrary, it has been suggested that project acceptability is higher when the public can influence decision making [12,13]. Hence, public participation in decision making is a critical factor that could enhance project acceptability [14–17]. We define public participation in decision making as the extent to which the public is involved in decision making and could influence aspects of a renewable energy project.

Although public participation in decision making seems critical for project acceptability, to our best knowledge, it is not clear yet via which

process(es) public participation in decision making affects project acceptability. Such knowledge is important as it provides critical insights into when public participation in decision making may or may not increase project acceptability. It has been suggested that public participation in decision making might affect project acceptability via perceived procedural fairness [18,19]. Yet, empirical evidence to support this reasoning is lacking. We define perceived procedural fairness as the extent to which the public evaluates the decision making as fair, open, transparent and taking different interests into account. To fill the gap in the literature, we conducted a series of experimental studies to test whether public participation in decision making enhances project acceptability by increasing perceived procedural fairness. In addition, as explained below, we tested whether perceived procedural fairness depends on which aspects of a renewable energy project people can influence in decision making, namely major versus minor aspects of the project.

#### 1.1. Public participation in decision making and perceived procedural fairness

It has been proposed that public participation in decision making can enhance perceived procedural fairness [18–20]. That is, the more people can influence decision making, the more likely they are to perceive the decision-making process as fair, open and transparent. In turn, perceived procedural fairness is positively associated with public accept-

\* Corresponding author.

E-mail addresses: [lu.liu@rug.nl](mailto:lu.liu@rug.nl) (L. Liu), [t.bouman@rug.nl](mailto:t.bouman@rug.nl) (T. Bouman), [g.perlaviciute@rug.nl](mailto:g.perlaviciute@rug.nl) (G. Perlaviciute), [e.m.steg@rug.nl](mailto:e.m.steg@rug.nl) (L. Steg).

ability of energy projects [18,21–25]. That is, the more people perceive the decision making as fair, open, transparent and representing different interests, the more acceptable they find the related energy project. On the basis of the above, we hypothesize that public participation in decision making affects perceived procedural fairness, which would, in turn, affect project acceptability.

Yet, the relationship between public participation in decision making about renewable energy projects and perceived procedural fairness has mostly been examined via qualitative (e.g., [18,26,27]) or correlational studies (e.g., [25,28]) that do not allow teasing apart the cause and the effect in this relationship. For example, people may indeed consider the decision making to be fair *because* they can influence the decision making, but conversely, people may also report that the public was able to influence the decision making *because* they already considered the decision making to be fair and/or the relevant project to be acceptable (cf. [29]). To test the causal relationships, we use an experimental design that allows figuring out whether indeed changes in participation lead to changes in perceived procedural fairness and eventually project acceptability. Specifically, we test whether public participation in decision making leads to higher perceived procedural fairness compared to *no* public participation in decision making, and whether this, in turn, relates to higher project acceptability (Study 1).

### 1.2. Having influence over major versus minor aspects and perceived procedural fairness

We next study whether perceived procedural fairness depends on the type of aspects of a renewable energy project that people can influence when they participate in decision making. People could potentially influence many different aspects when they participate in decision making about renewable energy projects [30,31]. Importantly, some aspects could have major implications, such as the location of renewable energy facilities; we refer to them as *major aspects*. Other aspects would only have minor implications, such as the specific design of renewable energy facilities; we refer to them as *minor aspects* [5,16,32]. We expect that perceived procedural fairness is higher when participation allows people to influence major aspects, compared to minor aspects, of a renewable energy project. Specifically, having influence over minor aspects might give people the impression that only some of their trivial interests are taken into account, which have little impacts on their life [5,32]. There is some initial evidence to suggest that having influence over major aspects leads to higher project acceptability compared to only having influence over minor aspects [16]. Yet, this study did not investigate whether perceived procedural fairness could explain this relationship. We address this gap by testing whether having influence over major, rather than minor, aspects of a project leads to higher perceived procedural fairness, and whether this, in turn, leads to higher project acceptability (Study 2 and 3). The findings promise important practical implications. In practice, public participation procedures are oftentimes limited to public influence over minor aspects. Yet, with the increasing advocacy for public participation in decision making [14], there are new initiatives where people have more influence in decision making, for example in the project “Wind platform: An Exploration” in the Netherlands (Windplatform: Een verkenning; [33]), where citizens and developers together decide upon the design of wind turbines and the distribution of costs and benefits. With public participation in decision making entering the policy agendas on renewable energy, it is highly important and timely to better understand the effects of public influence over different aspects of the project on perceived procedural fairness and project acceptability.

To sum up, we test two hypotheses. First, we hypothesize that public participation in decision making affects public acceptability of renewable energy projects via perceived procedural fairness (Hypothesis 1). Second, we hypothesize that public participation is particularly likely to enhance perceived procedural fairness and project acceptability when

people can influence *major*, versus only *minor*, aspects of the project (Hypothesis 2). We test the hypotheses step-by-step in three experimental studies using student samples. Across the experiments, we gradually increased the relevance of the renewable energy project and the participation procedures in order to test the robustness of our findings. On the one hand, public participation, particularly in influencing major aspects of a project, may increase project acceptability when people think about abstract/hypothetical projects because they particularly think about the benefits of participation, but not when people have to participate themselves because they may also consider the costs of participation, such as the time and effort they would need to invest [34]. On the other hand, it could be that particularly when people themselves would participate they appreciate the opportunity to participate and having influence over major aspects of the project, and would thus evaluate the decision making fairer and the project more acceptable. Accordingly, we studied whether our proposed reasoning holds for less relevant projects when the general public was invited to participate and students themselves did not necessarily have to participate (Study 1), as well as very relevant projects when only students were invited for participation (Study 2) and eventually when students would need to participate by signing up for participation (Study 3).

## 2. Study 1

Study 1 tests whether public participation in decision making affects project acceptability via perceived procedural fairness (H1).

### 2.1. Method

#### 2.1.1. Participants

We recruited 222 participants,<sup>1</sup> of which 129 did not pass the manipulation check (see below) and were thus excluded from the analysis.<sup>2</sup> Two responses were excluded because of missing data on key variables, leaving 90 valid participants for further analysis. In total 34 participants were male and 56 were female, with a mean age of 22 years ( $SD = 2.92$ ).

#### 2.1.2. Procedure and design

Participants first read that the local municipality wants to promote the use of renewable energy and has assigned an energy company to develop a wind energy project in a park outside the city center. Next, following a between-subjects design, we systematically varied whether the public could participate in decision making about the project, as described in Table 1.

#### 2.1.3. Measures

After reading the scenario, participants first completed a manipulation check. Next, they indicated to what extent they find the decision making fair, and to what extent they find the project acceptable, respectively. Afterward, participants were asked to provide their demographics.

**Manipulation check.** Participants were asked to indicate who could participate in decision making about the project. Four options were provided a) the local municipality, b) the energy company (correct answer in condition when the public could not participate), c) the public, and d) a board consisting of representatives of the energy company and the public (correct answer in condition when the public could participate).

<sup>1</sup> Specifically, 25 participants were recruited from a first-year university psychology student participant pool. The other 196 participants were recruited by distributing a link to the questionnaire via Facebook and WhatsApp, most of whom were also university psychology students.

<sup>2</sup> The pattern of results did not change when we included participants who did not pass the manipulation check in the analysis.

**Table 1**  
Manipulation of public participation in decision making<sup>a</sup>.

Manipulation	Text
Public participation in decision making	The energy company has decided to invite the public to join a collaborative decision-making board for this project. This board will take all decisions regarding the project, such as the size of the facilities and the location of the wind park. The board will consist of 50% company representatives and 50% representatives of different citizen groups, such as young families, elderly people, and students like you.
No public participation in decision making	The energy company will take all decisions regarding the project, such as the size of the facilities and the location of the wind park. The public will not participate in the decision-making process.

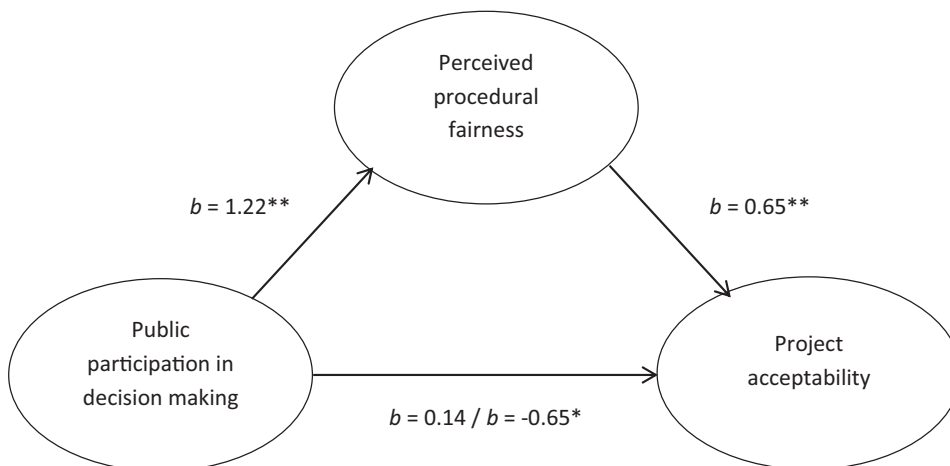
<sup>a</sup> Full questionnaires of all studies are available upon request of the first author.

**Table 2**  
Mean scores of perceived procedural fairness and project acceptability across conditions (Study 1).

		Study 1	
		M	SD
Perceived procedural fairness	Public participation in decision making	4.27**	0.97
	No public participation in decision making	3.05**	0.79
Project acceptability	Public participation in decision making	5.03	1.41
	No public participation in decision making	4.88	1.19

Note:.

\*\* Implies significant difference between means at  $p < .001$ .



\* $p < .05$ , \*\* $p < .001$

**Fig. 1.** Effect of public participation in decision making on perceived procedural fairness and project acceptability (Study 1). The first coefficient below the horizontal arrow indicates the direct effect of public participation on acceptability, without controlling for perceived procedural fairness; the second coefficient indicates the direct effect when controlling for perceived procedural fairness.

**Perceived procedural fairness.** We asked participants to rate on a 7-point scale ranging from 1 *strongly disagree* to 7 *strongly agree* to what extent they agree with the following statements: (1) opinions of the public are taken into account sufficiently in the decision-making process, (2) in the decision-making process, local interests are taken into account sufficiently, (3) the decision-making process is free of bias, (4) the decisions will be made based on accurate information, and (5) the decision-making procedures uphold ethical and moral standards [19,27,35]. We computed the mean score on these five items, reflecting perceived procedural fairness ( $M = 3.73$ ,  $SD = 1.08$ ,  $\alpha = 0.82$ ). For mean scores in each condition, see Table 2.

**Project acceptability.** We asked participants to what extent, on a 7-point scale ranging from 1 to 7, they thought the project would be: *very unacceptable* to *very acceptable*, *very bad* to *very good*, *very negative* to *very positive*, and *very unnecessary* to *very necessary*. We computed the mean score on these four items, reflecting participants' evaluation of acceptability of the project ( $M = 4.96$ ,  $SD = 1.31$ ,  $\alpha = 0.92$ ). For mean scores in each condition, see Table 2.

## 2.2. Results and discussion

Following Hayes's process procedures for testing mediation, we examined whether perceived procedural fairness mediated the relationship between public participation in decision making and project acceptability. As expected, public participation in decision making (versus no public participation in decision making) resulted in higher perceived procedural fairness ( $b = 1.22$ ,  $p < .001$ , 95% CIs [0.85, 1.60]). Also, we found a significant positive relationship between perceived procedural fairness and project acceptability ( $b = 0.65$ ,  $p < .001$ , 95% CIs [0.37, 0.93]). Yet, public participation in decision making did not have a significant direct effect on project acceptability ( $b = 0.14$ ,  $p = .61$ , 95% CIs [-0.41, 0.70]). Interestingly, after including perceived procedural fairness in the model, public participation in decision making was significantly negatively related to project acceptability ( $b = -0.65$ ,  $p = .036$ , 95% CIs [-1.26, -0.04]; Sobel  $z = 3.70$ ,  $p < .001$ ), as depicted in Fig. 1. This suggests that public participation in decision making not only may increase perceived procedural fairness, but also has other consequence(s) that may decrease rather than increase project acceptability.

**Table 3**  
manipulation of having influence over major versus minor aspects.

Manipulation	Text
Having influence over <i>major</i> aspects	During the decision making, together with other students, <i>you will have a say on all aspects of the project</i> , such as whether or not lectures will be moved to the campus outside the city center, whether or not classes will start early in the mornings, whether they will end late in the evenings, and whether there will be classes in the weekends. You could also propose alternative projects for making the faculty more sustainable.
Having influence over <i>minor</i> aspects	The faculty has already decided that all lectures will be moved to the campus outside the city center. During the decision making, together with other students, <i>you will have a say on some aspects of the project</i> , such as whether the morning classes will start at 7:00 am or 8:00 am, whether evening classes will finish at 9:00 pm or 10:00 pm, and whether to schedule the classes on Saturdays or Sundays.

Note: The same words were in bold and italics in the questionnaire, as presented in Table 3.

ity. We come back to this in the general Discussion. In sum, the results of Study 1 showed that public participation in decision making increased perceived procedural fairness, and this, in turn, led to higher project acceptability.

### 3. Study 2

Study 2 tests whether having influence over major rather than minor aspects of the project enhances perceived procedural fairness and in turn project acceptability (H2). The renewable energy project in Study 1 might not have been very relevant for students and students might not have thought of their own participation. Hence, to increase the relevance of the project and participation procedures for students, this time, we focused on a renewable energy project in students' own university where only students were invited to participate in the decision making.

#### 3.1. Method

##### 3.1.1. Participants

In total, 200 questionnaires were distributed via a first-year university psychology student participant pool, of which 182 filled out the questionnaire. We removed responses of 40 participants that failed the manipulation check (see below), leaving 142 participants for further analysis,<sup>3</sup> of which 32 were male and 110 were female, with a mean age of 20 years ( $SD = 1.87$ ).

##### 3.1.2. Procedure and design

We again followed a between-subjects design. The participants first read that their faculty "aims to stop using fossil fuels, such as oil, coal, and gas, and only use renewable energy sources, such as solar and wind energy, in order to mitigate climate change and protect the environment. To realize this ambition, the faculty is considering moving all lectures to buildings outside the city center, because these buildings are more energy-efficient, generate their own solar energy, and are located near wind turbines. Furthermore, to make optimal use of the renewable energy, lectures will be spread more throughout the day, starting earlier (around 7:00 am) and finishing later (around 10:00 pm).<sup>4</sup> Moreover, lectures will be scheduled in weekends (either on Saturday or Sunday)." Therefore, the project would have direct consequences for students and thus was more relevant for students.

The participants then read that a small opinion poll among students of the faculty last year showed that about half of the students were in favor of this project because it benefits the environment and helps to limit climate change, while the other half opposed this project because it is inconvenient for students. We indicated that given these different opinions, the faculty would like to involve students in decision making about this project, and that the faculty would organize meetings with

students to discuss their preferences and concerns. We emphasized that if the participant themselves wants to influence the decision making, it is very important that they attend these meetings, particularly due to the almost equally split opinions among students.

Next, we varied the type of aspects, namely *major* versus *minor*, that participants could influence when they participate in the decision making,<sup>5</sup> as described in Table 3.

##### 3.1.3. Measures

After reading the scenario, participants first completed a manipulation check and then indicated to what extent they find the project acceptable and next to what extent they find the decision making fair. Afterward, participants were asked to provide their demographics.

**Manipulation check:** We asked the participants which aspects of the project they could influence. They had to select one of two options, namely a) some aspects (correct answer in condition when the public had influence over minor aspects), versus b) all aspects (correct answer in condition when the public had influence over major aspects).

**Project acceptability:** We adopted the same measure as in Study 1. We computed the mean score on the four items reflecting participants' evaluation of acceptability of the project ( $M = 0.74$ ,  $SD = 1.38$ ,  $\alpha = 0.81$ ). For mean scores in each condition, see Table 4.

**Perceived procedural fairness:** In Study 2, we adopted a more precise measure of perceived procedural fairness based on the literature [36,37]. We asked participants to what extent, on a 7-point scale ranging from -3 to 3, they thought the decision-making process about this project was: *very unfair to very fair, totally not open to very open, totally not transparent to very transparent, and not at all taking different interests into account to very much taking different interests into account*. We computed the mean score on these four items, reflecting perceived procedural fairness ( $M = 0.84$ ,  $SD = 1.58$ ,  $\alpha = 0.89$ ). For mean scores in each condition, see Table 4.

<sup>5</sup> We also manipulated the amount of time that participants would need to invest in participating in decision making to address another question, namely whether people's willingness to participate in decision making depends on the amount of time investment needed, and whether the effect of having influence over major versus minor aspects on willingness to participate depends on the amount of time that needs to be invested. We found that our manipulation of time investment did not affect participants' willingness to participate in decision making. In addition, we did not find any main effect of time investment ( $F(1, 138) = 0.04$ ,  $p = .84$ ,  $\eta^2 < .001$ ) nor an interaction effect with having influence over major versus minor aspects ( $F(1, 138) = 0.24$ ,  $p = .62$ ,  $\eta^2 = .002$ ) on perceived procedural fairness. In addition, we did not find any main effect of time investment ( $F(1, 138) = 0.03$ ,  $p = .86$ ,  $\eta^2 < .001$ ) nor an interaction effect with having influence over major versus minor aspects ( $F(1, 138) = 0.89$ ,  $p = .35$ ,  $\eta^2 = .006$ ) on project acceptability. Furthermore, the pattern of results of the mediation analysis in Study 2 did not change when we included the manipulation of time investment as a covariate in the model, therefore, we report the mediation results without including time investment as a covariate.

<sup>3</sup> The pattern of results did not change when we included participants that did not pass the manipulation check in the analysis.

<sup>4</sup> Current lectures at the faculty start at 9:00 am and end at 5:00 pm.



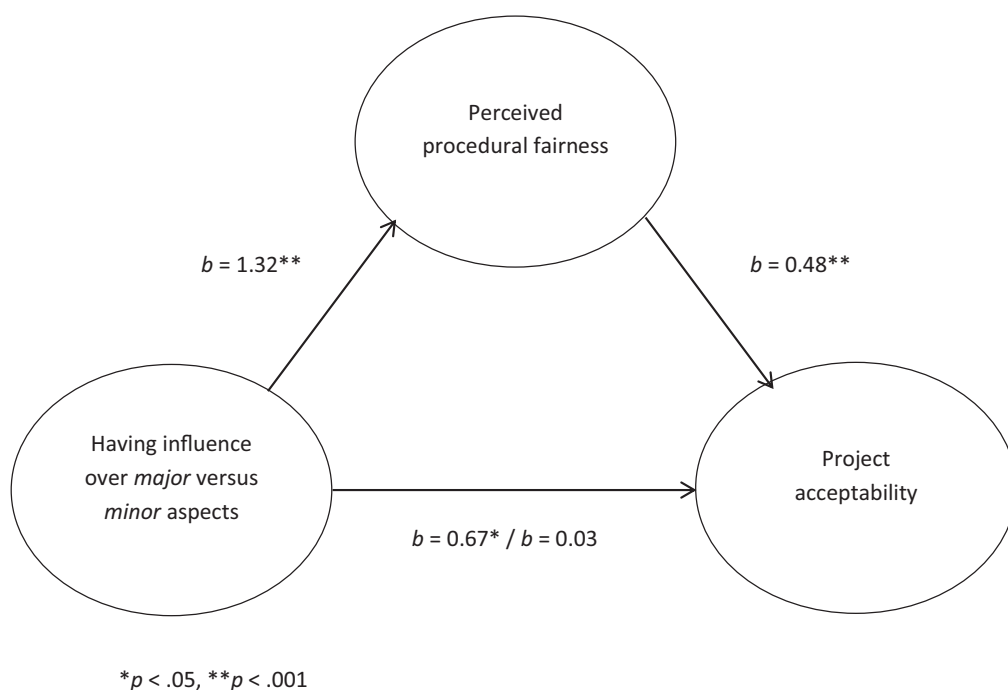
**Table 4**  
Mean scores of perceived procedural fairness and project acceptability across conditions (Study 2 and Study 3).

		Study 2		Study 3	
		M	SD	M	SD
Perceived procedural fairness	Having influence over <i>major</i> aspects	<b>1.55**</b>	1.48	<b>1.38*</b>	1.36
	Having influence over <i>minor</i> aspects	<b>0.23**</b>	1.41	<b>0.51**</b>	1.45
Project acceptability	Having influence over <i>major</i> aspects	<b>1.09*</b>	1.45	0.77	1.59
	Having influence over <i>minor</i> aspects	<b>0.42*</b>	1.25	0.98	1.64

Note:

\* Implies significant difference between means in each study at  $p < .05$ .

\*\* Implies significant difference between means in each study at  $p \leq .001$ .



**Fig. 2.** Effect of having influence over major versus minor aspects on perceived procedural fairness and project acceptability (Study 2). The first coefficient below the horizontal arrow indicates the direct effect without controlling for perceived procedural fairness; the second coefficient indicates the direct effect when controlling for perceived procedural fairness.

### 3.2. Results and discussion

Following Hayes’s process procedures for testing mediation, we examined whether the effect of having influence over *major* versus *minor* aspects on project acceptability was mediated by perceived procedural fairness. As expected, having influence over major (versus minor) aspects resulted in higher perceived procedural fairness ( $b = 1.32, p < .001, 95\% \text{ CIs } [0.84, 1.79]$ ). Also, there was a significant positive relationship between perceived procedural fairness and project acceptability ( $b = 0.48, p < .001, 95\% \text{ CIs } [0.35, 0.62]$ ). Moreover, having influence over major (versus minor) aspects significantly increased project acceptability when we did not control for perceived procedural fairness ( $b = 0.67, p = .004, 95\% \text{ CIs } [0.22, 1.12]$ ). The direct effect of having influence over major aspects on project acceptability was no longer statistically significant ( $b = 0.03, p = .87, 95\% \text{ CIs } [-0.39, 0.46]$ ) after including perceived procedural fairness in the model (Sobel  $z = 4.29, p < .001$ ), indicating a full mediation (Fig. 2). In sum, Study 2 showed that having influence over major aspects of the project increased perceived procedural fairness and in turn project acceptability.

### 4. Study 3

Study 3 further tests whether having influence over major rather than minor aspects of the project enhances perceived procedural fair-

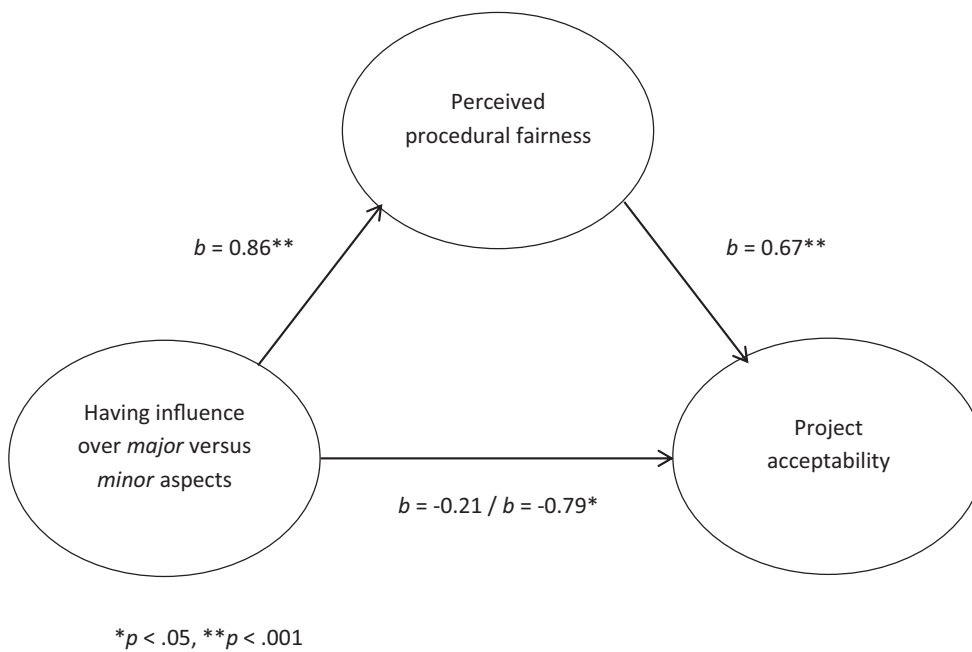
ness and in turn project acceptability (H2). In Study 2, the participants may not necessarily have thought that they themselves would participate, but for example that other students might participate, and thus they might not have considered that they themselves would have to invest time and effort in the decision making. In Study 3, we aimed to test the robustness of the findings while emphasizing even more that student themselves would need to participate, by asking them to sign up for participation.

#### 4.1. Method

##### 4.1.1. Participants

Again, 200 questionnaires were distributed via the first-year university psychology student participant pool. Only participants who did not participate in Study 2 were offered the opportunity to participate in Study 3. Eventually, 162 participants filled out the questionnaire, of which 160 completed all questions. We removed responses of participants that failed the manipulation check, leaving 129 participants for further analysis,<sup>6</sup> among whom 35 were male and 94 were female, with a mean age of 21 years ( $SD = 2.55$ ).

<sup>6</sup> The pattern of results did not change when we included participants that did not pass the manipulation check in the analysis.



**Fig. 3.** Effect of having influence over major versus minor aspects on perceived procedural fairness and project acceptability (Study 3). The first coefficient below the horizontal arrow indicates the direct effect without controlling for perceived procedural fairness; the second coefficient indicates the direct effect when controlling for perceived procedural fairness.

#### 4.1.2. Procedure, design, and measures

We first included three measures to emphasize that the student themselves would need to participate in decision making. Specifically, participants indicated whether they want to participate in a meeting in which they could influence the aspects of this project mentioned in the manipulation. They were offered two options: a) yes, I want to participate in the meeting (25 participants chose this option), and b) no, I do not want to participate in the meeting (104 participants chose this option). Second, if the participants chose to participate in the meeting, they were asked to indicate at which time slots they would be able to attend the meeting, and to provide an email address to receive the invitation with further details on the meeting. Third, we asked participants to indicate whether they would like to receive some information on the project to prepare for the meeting. They were offered two options: a) yes, I would like to receive the information (29 participants chose this option), and b) no, I would not like to receive the information (100 participants chose this option). Again, if they indicated they want to receive the information, they were asked to provide an email address to receive the information.

For all other aspects, Study 3 was identical to Study 2.<sup>7</sup> Again, we computed the mean score of the relevant items to form the scale of project acceptability ( $M = 0.88$ ,  $SD = 1.61$ ,  $\alpha = 0.92$ ), and perceived procedural fairness ( $M = 0.93$ ,  $SD = 1.47$ ,  $\alpha = 0.89$ ). For mean scores in each condition, see Table 4.

<sup>7</sup> We again manipulated time investment in Study 3 to address the same research question as mentioned in footnote 6. We again found that our manipulation of time investment did not affect participants' willingness to participate in decision making. In addition, we did not find any main effect of time investment ( $F(1, 125) = 0.004$ ,  $p = .95$ ,  $\eta^2 < .001$ ) nor an interaction effect with having influence over major versus minor aspects ( $F(1, 125) = 0.24$ ,  $p = .63$ ,  $\eta^2 = .002$ ) on perceived procedural fairness. In addition, we did not find any main effect of time investment ( $F(1, 125) = 0.11$ ,  $p = .74$ ,  $\eta^2 = .001$ ) nor an interaction effect with having influence over major versus minor aspects ( $F(1, 125) = 0.04$ ,  $p = .85$ ,  $\eta^2 < .001$ ) on project acceptability. Moreover, the pattern of results of the mediation analysis in Study 3 did not change when we included the manipulation of time investment as a covariate in the model, therefore, we report the mediation results without including time investment as a covariate.

#### 4.2. Results and discussion

Again, Hayes's process procedures for testing mediation revealed that having influence over major (versus minor) aspects resulted in higher perceived procedural fairness ( $b = 0.86$ ,  $p < .001$ , 95% CIs [0.37, 1.35]). Also, there was again a significant positive relationship between perceived procedural fairness and project acceptability ( $b = 0.67$ ,  $p < .001$ , 95% CIs [0.51, 0.84]). This time the direct effect of having influence over major aspects on project acceptability was not statistically significant ( $b = -0.21$ ,  $p = .47$ , 95% CIs [-0.77, 0.36]). Interestingly, having influence over major aspects led to lower project acceptability when including perceived procedural fairness in the model ( $b = -0.79$ ,  $p = .0015$ , 95% CIs [-1.27, -0.31]; Sobel  $z = 3.17$ ,  $p = .0015$ ), as illustrated in Fig. 3. These results are similar to the results of Study 1, and suggest that besides increasing perceived procedural fairness, having influence over major aspects might have other consequences that may even decrease project acceptability. We discuss this finding in more detail in the general Discussion. In sum, Study 3 replicated the finding of Study 2 that having influence over major aspects of the project increased perceived procedural fairness and this, in turn, led to higher project acceptability.

#### 5. General conclusion and discussion

We studied whether public participation in decision making enhances perceived procedural fairness and public acceptability of renewable energy projects. Next, we tested whether perceived procedural fairness mediates the relationship between public participation in decision making and public acceptability of renewable energy projects. Moreover, we tested whether perceived procedural fairness is higher when the public could participate and particularly have influence over major aspects, rather than minor aspects of the project.

Results of Study 1 showed that public participation in decision making increased perceived procedural fairness, and this, in turn, enhanced project acceptability, compared to no public participation in decision making at all. This finding provides important causal evidence in addition to earlier qualitative (e.g., [18,26]) and correlational studies (e.g., [25,28]) on the positive relationship between public participation in decision making and perceived procedural fairness. Next, results of Study

2 and Study 3 showed that particularly having influence over major aspects of a renewable energy project led to higher perceived procedural fairness, compared to having influence over only minor aspects of the project, and this, in turn, led to higher project acceptability. This finding extends previous research by examining why having influence over major aspects has a positive effect on project acceptability [16]: because having influence over major aspects enhances perceived procedural fairness. Moreover, the findings were consistent when the project and participation procedures might be somewhat less as well as more relevant for participants, and as it was increasingly emphasized that participants would need to participate themselves.

Interestingly, when controlling for perceived procedural fairness, public participation in decision making had no effect (Study 2) and even a negative effect (Study 1 and 3) on project acceptability, particularly when people could influence major aspects. These results suggest that public participation in decision making, particularly when having influence over major aspects, may not only have positive effects on project acceptability by enhancing perceived procedural fairness, but might have other consequences as well that may even reduce project acceptability. Future research is needed to test whether this negative effect can be replicated, and which other aspects of public participation might account for it. Since we did not find any effect of time investment on project acceptability in our studies, this negative association is unlikely to be caused by how much time the participants need to invest in participation. One possible reason for this negative association could be that people may think citizens lack competence and expertise to make decisions about renewable energy projects, because renewable energy projects are typically rather complex [38–41], and this may eventually decrease people's acceptability of the project. Future research could explore this possibility.

Our findings have important practical implications. Specifically, the results show that project acceptability is higher when people perceive the decision-making process as fairer. Importantly, one way to enhance perceived procedural fairness is to involve people in decision making, and particularly by enabling people to influence decisions over major aspects of the project. In addition, although public participation in decision making has been widely considered beneficial for developing more socially acceptable renewable energy projects [14–17], our results suggest that involving people in decision making and particularly in influencing major aspects, may not always enhance project acceptability. Though we were unable to detect why this is the case in this research, practitioners should be aware of the possibility that allowing people to influence decision making on (major aspects of) renewable energy projects may result in low project acceptability. Importantly, future research is needed to clarify what could account for the negative effect of public participation on acceptability, and practitioners could take those into consideration when designing participation strategies. For example, practitioners may need to provide expert support to ensure expertise when involving the public in influencing decision making.

Some limitations need to be considered. Using student samples may limit the generalizability of our findings, in particular regarding the mean scores obtained. Specifically, students may in general be more favorable of renewable energy projects. Yet, it is important to note that the main aim of our studies was to investigate the relationships between variables, which previous research indicated to typically not differ across different samples (e.g., [42,43]). Moreover, we see no theoretical grounds to assume that public participation, perceived procedural fairness and project acceptability will relate differently to each other when examining general population samples than students. Future studies are needed to test whether the findings can be replicated with representative samples.

Furthermore, the strength of the relationship between public participation, perceived procedural fairness and project acceptability may differ in different cultures and for different types of energy projects. For example, it has been suggested that people from different cultures might have different expectations of what procedural fairness means, such as

how much influence the public can or should have [13]. Specifically, people in individualistic culture may find the decision making fairer if the public has influence over major aspects of a project, because they typically value expressing their opinions publicly and having influence over decisions that may possibly affect them [44]. In contrast, people in collectivistic culture are less willing to express their opinions publicly [44] and particularly used to await decisions from responsible agents, such as the government [45]. Hence, they may think it is the responsible agents' responsibility to offer (major) decisions and would thus find the decision making fairer. As a result, the effects of public participation (in influencing major aspects) may have smaller effects on perceived procedural fairness in collectivistic than individualistic cultures. Moreover, the renewable energy projects presented in our studies may be perceived as less risky and less controversial than other types of renewable energy projects, such as geothermal projects [46,47]. The literature suggests that when a project is perceived as highly risky, perceived procedural fairness might have a very small impact on project acceptability, because in that case perceived risks and benefits play a more important role (cf. [37]). Hence, when people perceive the project to be highly risky, they may not find the decision making to be fairer and the project acceptable even if the public can influence (major aspects of) the project. Future research could test whether this is the case for renewable energy projects with perceived higher risks.

We conducted experimental studies, which are rare in the literature, but are much needed in order to secure internal validity and to obtain insights in how public participation, perceived procedural fairness and project acceptability are causally related. At the same time, real-life energy projects may present different circumstances than those in our controlled experiments. Obviously, real-life situations differ on many more factors than on the level of participation alone, which could also influence the relationships studied here. Also, although we tried to make the projects and participation procedures as relevant and realistic as possible, these were still hypothetical scenarios. Accordingly, responses may not fully reflect a real-life situation in which individuals are actually influenced by the project. Future research is needed to test the external validity of our findings in real-life situations where people are actually involved in the decision-making processes, including correlational studies, longitudinal studies, and field (quasi) experiments. Furthermore, our studies did not contain a comparison of no public participation in decision making versus having influence over minor aspects of the project. Future research could test whether having any influence would already have positive effects on perceived procedural fairness and project acceptability, or whether the public would prefer better no influence rather than a little bit of influence.

To conclude, our research is the first to experimentally show that public participation in decision making, particularly when people can influence major aspects, leads to higher perceived procedural fairness, and this, in turn, leads to higher project acceptability. Meanwhile, we found that next to the positive effect of public participation on perceived procedural fairness, public participation, particularly having influence over major aspects, may have negative consequences that may result in lower project acceptability. Future studies need to examine via which other processes (next to perceived procedural fairness) public participation in decision making affects public acceptability of renewable energy projects in positive or negative ways. Such knowledge can contribute to a more thorough understanding of how and why public participation in decision making affects public acceptability of renewable energy projects.

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## Declaration of Competing Interest

None.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.egycc.2020.100013](https://doi.org/10.1016/j.egycc.2020.100013).

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