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# The more public influence, the better? The effects of full versus shared influence on public acceptability of energy projects in the Netherlands and China

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*

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ABSTRACT

Public participation in decision making is considered an important factor that could enhance public acceptability of decision-making process and resulting decisions on renewable energy projects. Yet, little is known about *when* and *how* public participation can enhance public acceptability. In two experimental studies where no real decisions were taken, we compare the effect of shared influence versus full influence (either with or without expert support) on public acceptability of the decision-making process, the decisions to be taken, and the resulting energy projects. Results showed that having full influence over decision making (e.g., citizen control) did not lead to higher public acceptability of the decision-making process, final decision and resulting project, compared to having shared influence (e.g., partnership). Respondents perceived the public as not having sufficient expertise to develop energy projects and believed that full influence would lead to lower quality decisions, which may explain why full influence did not enhance public acceptability. Interestingly, the decision-making panel comprising both experts and citizens was evaluated as having more expertise and more capable to take high quality decisions, compared to a decision-making panel comprising only citizens and even when citizens could consult experts. The pattern of results was very consistent in the Netherlands and China.

## 1. Introduction

One crucial strategy to mitigate climate change and its negative impacts is to transit from fossil fuels (e.g., coal and natural gas) to renewable energy sources (e.g., solar and wind energy) [1]. The success of such a transition depends on public acceptability of renewable energy projects [2–7], which we define as the extent to which people evaluate renewable energy projects (un)favourably. Indeed, renewable energy projects may be delayed or even cancelled if they face strong public resistance [8–11]. Hence, an important question is which factors affect public acceptability of renewable energy projects.

Public participation in decision making is considered an important factor that could enhance public acceptability of the decision-making process and the resulting decisions on renewable energy projects [12–15]. We define public participation in decision making as processes organized by responsible agents (e.g., governments, companies) to involve the public in the planning, design, and implementation of projects. Initial evidence suggests that public acceptability of the decision-making process, the resulting decisions, and the resulting energy projects is indeed higher when people are involved in the decision making than when they are not involved [16], while public resistance may particularly occur if people feel excluded from the decision making [17,18].

Although public participation in decision making is generally considered beneficial for enhancing public acceptability of the decision-making processes and energy projects, little is known about *when* and *how* public participation in decision making can enhance public acceptability of the decision-making process, of decisions to be taken, and of resulting energy projects. We propose that one important aspect of public participation that determines its effects on public acceptability is the amount of influence the public could have in the decision-making process. Specifically, public participation may not increase acceptability if people have no or little influence in the decision-making process, whereas public participation may enhance acceptability of the decision-making process and resulting decisions on renewable energy projects when the public can significantly influence the decision making. In two experimental studies, we test whether providing people with full influence (i.e., citizen control) leads to higher public acceptability of the

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

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decision-making process, and decisions to be taken and resulting renewable energy projects, compared to shared influence (i.e., partnership), and whether this is particularly likely the case when the public can rely on expert support. To examine the generalisability of the effects across populations, we conducted the studies in two geographically and culturally different contexts, namely the Netherlands and China.

### 1.1. Effects of public influence in decision making on public acceptability

The seminal Arnstein's participation ladder classifies public participation according to the amount of influence the public has in the decision-making process [19]. At the lowest level of the participation ladder is *no* influence (e.g., providing information only), followed by forms of participation with relatively *little* influence, where people can provide their opinions and their input is incorporated in final decisions, but they cannot make the final decisions themselves (e.g., consultation). At the higher levels of the ladder is *shared* influence, in which case people co-decide on the planning and design of projects with other responsible agents (e.g., partnership). At the top of the ladder is public participation with *full* influence, in which case the public makes final decisions themselves (e.g., citizen control). We conceptualize these types of public participation as no influence, little influence, shared influence, and full influence. Fig. 1 illustrates how our conceptualization of different amounts of influence relates to Arnstein's participation ladder.

Literature indicates that having influence in decision making enhances public acceptability of the decision-making processes, the final decisions and resulting energy projects compared to having no influence at all. For example, people evaluated the decision-making process about a wind energy project in the United States as fairer [20], and the resulting decisions on the wind energy projects as more acceptable, when people were consulted about their opinions on the energy projects, and when their opinions were incorporated into decisions, compared to only being informed about the projects [9,21]. Similarly, people evaluated the decision-making process and the related marine energy project in the island of Ireland more favorably when they made decisions together with responsible agents than when decisions were taken by responsible agents with no opportunity for the public to influence the decision making [22]. In fact, if people are consulted, but their input is not incorporated in final decisions, this can be seen as *fake* participation, which makes people perceive the decision-making process as unfair which may fuel public resistance towards those energy projects [18,23–25].

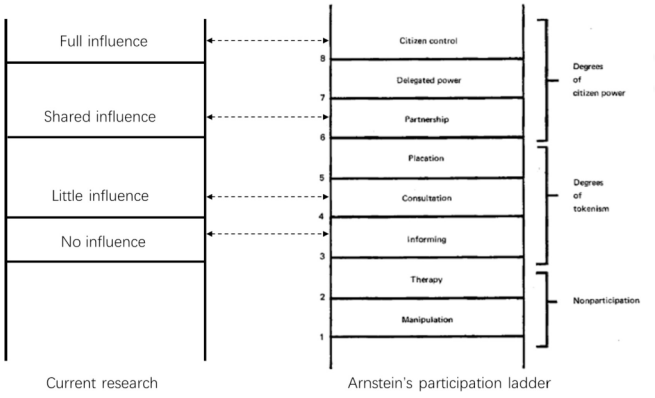


**Fig. 1.** Illustration of current research and Arnstein's participation ladder.

Hence, research suggests that having influence enhances public acceptability compared to having no influence at all. Yet, the question remains whether how much influence people have in the decision making matters for public acceptability of the decision-making process and resulting decisions and energy projects. A popular assumption is that the more influence the public has in decision making, the more acceptable they will evaluate the decision-making process and resulting decisions and renewable energy projects [9,21,22], as best illustrated by Arnstein's participation ladder (Fig. 1) [19]. Arguably, people may have better chances to shape the decisions and projects to be in line with their preferences and guarantee that their interests and concerns are taken into account when they have more influence in the decision making [26–28], and they may thus be more in favor of those decisions and projects. This popular assumption would imply that public participation with the highest amount influence (i.e., full influence) leads to highest public acceptability of the decision-making process, the decisions to be taken, and the resulting renewable energy projects compared to lower amounts of influence.

So far, this popular assumption has not been systematically tested. In addition, there is some initial evidence to suggest that the public may not necessarily favor full influence over final decisions about renewable energy projects. Instead, they seem to prefer to only have little or shared influence in decision making about renewable energy projects, such as wind energy projects in Germany [29–32]. For example, in a study in the Netherlands, people preferred that the public is consulted about sustainable energy transitions rather than that decisions are fully made by the public themselves [32].

One possible reason for why people do not prefer to have full influence is that they think citizens involved in the decision making lack competence and expertise (e.g., knowledge) to take good quality decisions about renewable energy projects. We use "expertise" to describe the knowledge of public representatives and other agents who will take decisions. Renewable energy projects are typically rather complex, and the planning and implementation of such projects may require professional expertise [33–36] which an average citizen may not have [37–39].

This may imply that full influence will particularly result in higher acceptability of the decision making and resulting decision when people believe the decision-making panel has sufficient expertise. One way to secure citizens involved in the decision-making process have sufficient expertise to decide on renewable energy projects is by providing expert support, in which case those citizens can consult experts about the design of and any other issues related to those energy projects [40–43]. If expert support is provided, the public may perceive that citizens involved in the decision-making process have more expertise and may therefore perceive their final decisions as of higher quality. We therefore hypothesise that full influence particularly leads to higher public acceptability of the decision-making process and resulting decisions and energy projects than shared influence when citizens involved in the decision-making process can consult experts.

Another important question is whether more public influence indeed *causes* higher public acceptability of the decision-making process, and of resulting decisions and renewable energy projects. As yet, the relationship between public influence in decision making and public acceptability of the decision-making process, and the resulting decisions and energy projects has mostly been examined via qualitative (e.g., [22]) and correlational studies (e.g., [23]) that do not allow to tease apart the cause and effect in this relationship. For example, public acceptability of renewable energy projects may be high *because* people could influence the decision making, but conversely, people may also report that they had influence in the decision making because they find the decision

making and/or the renewable energy project acceptable, or there may be a third factor that influences both (cf. [44]). To address this gap in the literature, we will conduct experimental studies in which we specifically vary the amounts of influence (i.e., shared influence versus full influence) people have in decision making and test their effects on public acceptability of the decision-making process and resulting decisions and renewable energy projects.

As yet, most studies on public participation and public acceptability of renewable energy projects have been conducted in Western European countries and North America (e.g., [20,30,45]). Hence, the question remains whether similar findings can be found in other countries. To address this question, we test our reasoning in a Western European country, the Netherlands, and in an East-Asian country, China. We expect to find similar results in both countries because research suggests that public influence in decision-making can increase support for the projects in both the Netherlands and China [13,46,47]. However, Dutch and Chinese cultures are also often considered rather different, with, for example, the first being individualistic [48] and the latter collectivistic [49]. These cultural factors might impact how much public influence is desirable and thus impact the effects of public influence on project acceptability. For instance, research suggests that having more influence may have a stronger effect on project acceptability in individualistic cultures, where people typically value having a say over decisions that may possibly affect them [50]. In contrast, in collectivistic countries, people particularly await the decisions from responsible agents, such as the government [49], rather than wanting the public to have much influence.

In sum, we aim to test whether full influence particularly leads to higher public acceptability of the decision-making process and resulting decisions and energy projects than shared influence when citizens involved in the decision-making process can consult experts. We first conducted a pilot study with a student sample in the Netherlands to (1) replicate the previous findings from the literature that having at least some influence leads to higher acceptability of the decision-making process and the project compared to having no influence, (2) pre-test the manipulations of shared influence and full influence, respectively, to be used in Study 1 & 2, (3) examine the internal validity of the measures of acceptability of the decision-making process, the final decision and the resulting energy project. Next, Study 1 aims to test the effect of shared versus full influence on acceptability of a hypothetical wind energy project in the Netherlands among a general population sample, and to test whether full influence particularly enhances acceptability when expert support is provided. Study 2 tests if the findings in Study 1 can be replicated in an East-Asian country, China.

## 2. Pilot study: Effects of public influence on public acceptability in the Netherlands

### 2.1. Method

#### 2.1.1. Procedure and participants

In total, 210 first-year university psychology students were invited to participate in the pilot study[1]. Eventually, 204 participants completed the study. We excluded responses of participants who did not pass the attention check (see below), leaving 114 responses for further analysis.

#### 2.1.2. Design

We followed a between-subjects design with four experimental conditions with increasing amounts of public influence, namely 1) no influence, 2) little influence, 3) shared influence, and 4) full influence. Students were randomly assigned to one of the four conditions.

Participating students first read that their faculty aims to replace the use of fossil fuels with renewable energy sources, which will have implications for them. Specifically, we indicated that the faculty is considering to move all lectures to buildings outside the city center, which use renewable energy, and to schedule lectures longer throughout the day and week. Next, the participants learned that, according to an opinion poll, about half of the students were in favor of the project because it benefits the environment and helps limiting climate change, while the other half opposed to this project because it is inconvenient for students. Following this, we manipulated the amounts of influence in decision making about the project[2], as described in Table 1.

#### 2.1.3. Measures

After reading the scenario, participants indicated how acceptable they find the decision-making process, the resulting final decision and the renewable energy project.

***Acceptability of the decision-making process.*** We asked the participants to indicate on a 7-point scale (ranging from −3 to 3), to what extent they think the decision-making process about the project was: *very unacceptable* to *very acceptable*, *very bad* to *very good*, and *very negative* to *very positive*. We computed the mean scores on these three items; higher scores reflect higher acceptability of the decision-making process ($M = 0.72$, $SD = 1.29$, $\alpha = 0.87$)[3].

**Table 1**
Manipulation of amount of influence in decision making.

| Amount of influence | Text |
|---|---|
| No influence | Students will not participate in the decision making about this project. |
| Little influence | The faculty plans to invite students to discuss about all aspects of the project. Your participation is important particularly due to the almost split opinions. Opinions of the participating students will be seriously considered by the faculty. Yet, the faculty will make final decisions on all aspects of the project. |
| Shared influence | The faculty plans to invite students to discuss about all aspects of the project. Your participation is important particularly due to the almost split opinions. The faculty and the participating students will make final decisions on all aspects of the project together. |
| Full influence | The faculty plans to invite students to discuss about all aspects of the project. Your participation is important particularly due to the almost split opinions. The participating students will make final decisions on all aspects of the project. |

[1] The participants were recruited via the university's participant pool. They were informed that the study aims to understand students' opinion about the university's renewable energy project. At the end of the study, students were informed that the study was in fact about their opinion on participation procedures about the project, and they were given the opportunity to delete their data at this stage. Filling out the questionnaire took about 15 min; by filling in the questionnaire, the students got a credit for their study program. An informed consent was obtained beforehand.

[2] We also manipulated whether participants thought that they would be randomly selected to participate in the decision making, to examine if public acceptability of the decision-making process, the final decision, and the resulting project depends on whether people think that they themselves would have to participate in decision making. Results showed that whether or not participants would have to participate did not interact with the amount of influence in affecting acceptability of the decision-making process, nor acceptability of the final decision, nor acceptability of the renewable energy project. We therefore do not elaborate on this point further. One possible reason for this finding could be that people might already be satisfied when they were aware that the decision will be made in a participatory way, even if they themselves do not participate [59].

[3] Mean scores, standard deviations, and number of cases for all dependent variables across conditions (with all participants and with only valid participants) for all studies can be found in Supplementary Information D.

***Acceptability of the final decision.*** We asked the participants to indicate on a 7-point scale (ranging from −3 to 3), to what extent they believed the final decision that would come out of the decision-making procedure would be: *very unacceptable* to *very acceptable*, *very bad* to *very good*, and *very negative* to *very* positive. We computed the mean scores on these three items; higher scores reflect higher acceptability of the final decision ($M = 0.64$, $SD = 1.39$, $\alpha = 0.93$).

***Acceptability of the project.*** We asked the participants to indicate on a 7-point scale (ranging from −3 to 3), to what extent they think the project resulting from the decision-making procedure 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 scores on these four items; higher scores reflect higher acceptability of the project ($M = 1.53$, $SD = 1.40$, $\alpha = 0.92$).

#### 2.1.4. Attention check

Next, the participants completed an attention check. In the no influence condition, we asked participants to indicate whether students will participate in the decision making about this project. Participants who wrongly answered the attention checks were excluded from the analysis. The correct answer was that students will not participate (78.57% valid response rate, $N = 22$). In the other three conditions, we asked participants who will make the final decision about the project. They had to select one of three options, namely "The faculty" (correct answer in little influence condition, 50.88% valid response rate, $N = 29$), "The faculty and the participating students together" (correct answer in shared influence condition, 83.05% valid response rate, $N = 49$), and "The participating students" (correct answer in full influence condition, 23.33% valid response rates, $N = 14$).[4]

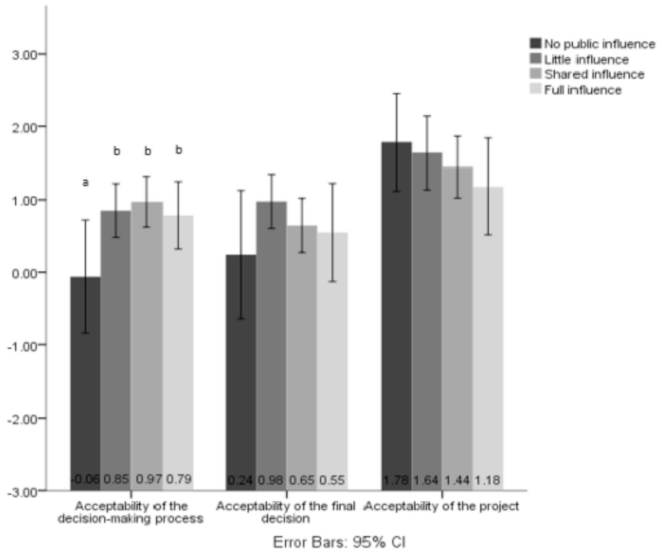


**Fig. 2.** Mean scores and standard deviations of acceptability of the decision-making process, acceptability of the final decision, and acceptability of the project for different amounts of influence (Pilot study) Note: different letters (a, b) indicate significant differences in the mean scores within each measure ($\alpha < 0.05$); the mean scores with the same letter do not significantly differ from each other within each measure.

### 2.2. Results: Acceptability of the decision-making process, the final decision and the project

A one-way between-subjects ANOVA revealed a significant difference in acceptability of the decision-making process across the four conditions, $F(3, 110) = 3.67$, $p = .015$, $\eta^2 = 0.091$. Post-hoc comparisons using the LSD test showed that in all conditions in which the public could influence decision making, namely little influence ($p = .011$, 95% CIs [0.21, 1.61]), shared influence ($p = .002$, 95% CIs [0.40, 1.67]), and full influence ($p = .049$, 95% CIs [0.002, 1.69]), acceptability of the decision-making process was significantly higher than when the students could not influence the decision-making process at all (Fig. 2).

One-way between-subjects ANOVAs revealed that there were no significant differences in acceptability of the final decision across conditions, $F(3, 110) = 1.20$, $p = .312$, $\eta^2 = 0.032$, nor in acceptability of the project across the conditions, $F(3, 110) = 0.65$, $p = .584$, $\eta^2 = 0.017$.

### 2.3. Discussion

The pilot study replicated findings from previous studies that having at least some influence leads to higher acceptability of the decision-making process compared to having no influence at all, but we did not find any differences across conditions for acceptability of the decisions and project. Also, we did not find differences in acceptability of the decision-making process between the little, shared and full influence conditions.

It is likely that our manipulations were not optimal. Specifically, the manipulations might have not been strong enough for participants to tell how much influence the students and the faculty each can have in decision making, and thus it was unclear who are the agents to take the final decisions. Based on the insights gained from the pilot study, we improve and strengthen the manipulations in Study 1 and 2. Specifically, we explicitly distinguish "who will be involved in decision-making process" from "who makes the final decision" (see Table 2). We include a manipulation check of the amount of influence people can have in decision making in Study 1 and 2 to check if the improved manipulations work successfully.

Moreover, Study 1 and 2 aim to test whether full influence may enhance acceptability compared to shared influence when the public can rely on expert support. Furthermore, Study 1 and 2 use a regional wind energy project rather than a faculty renewable energy project, with representative Dutch and Chinese samples instead of a student sample, to establish the generalisability of the findings.

## 3. Study 1: Effects of public influence and expert support on public acceptability in the Netherlands

Study 1 aims to test whether full influence would lead to higher public acceptability of the decision-making process, the resulting decisions and energy projects, compared to shared influence, when people would be provided with expert support in the Netherlands, among a general population sample.

### 3.1. Method

#### 3.1.1. Procedure and participants

We conducted an online questionnaire study with respondents from a pre-recruited Dutch panel. Participants received an invitation to complete an online study about local renewable energy projects; an informed consent was obtained beforehand. Participants received a token amount of money

[4] The pattern of results did not change when all responses were included in the analysis.

for their participation. The questionnaire was in Dutch.[5] We received 215 valid responses for further analyses[6], of which 109 were male and 106 were female, with the mean age of 56 years ($SD$ = 17.44). See Supplementary Information A for detailed demographic information.

### 3.1.2. Design

The study followed a between-subjects design. All participants first read that a wind energy project is being planned to be developed in the area they live in and a decision-making panel will be formed to discuss and take decisions about all aspects of this project. Next, participants were randomly assigned to one of the three experimental conditions, namely shared influence, full influence, and full influence with expert support, as illustrated in Table 2.

**Table 2**
Manipulation of public influence in decision making and whether expert support is provided.

| | |
|---|---|
| Shared influence | **Who will be involved in decision-making process?** Half of the members of the decision-making panel would be experts from an energy company and the other half will be residents in the area you live in. Residents in the decision-making panel can ask experts from the energy company for advice on this wind energy project. The energy company has been developing wind energy projects for many years. The energy company has much experience, extensive knowledge, and expertise in developing wind energy projects. **Who makes the final decision?** The residents and experts from the company who take part in the decision-making panel will together make the final decision on all aspects of the wind energy project. |
| Full influence | **Who will be involved in decision-making process?** All members of the decision-making panel would be residents in the area you live in. **Who makes the final decision?** Residents who take part in the decision-making panel will together make the final decision on all aspects of the wind energy project. |
| Full influence with expert support | **Who will be involved in decision-making process?** All members of the decision-making panel would be residents in the area you live in. **Expert support** Residents in the decision-making panel can ask experts from the energy company for advice on this wind energy project. The energy company has been developing wind energy projects for many years. The energy company has much experience, extensive knowledge, and expertise in developing wind energy projects. **Who makes the final decision?** Residents who take part in the decision-making panel will together make the final decision on all aspects of the wind energy project. The experts from the energy company are NOT part of the decision-making panel and they will NOT decide on the wind energy project. |

At the end, participants were told that the wind energy project will be implemented based on the final decision taken by the decision-making panel.

### 3.1.3. Attention check

In all three conditions, we first asked participants who will make the final decision according to the text they read. They had to select one of the three options, namely a) Only the energy company (incorrect answer in all conditions), b) Only residents (correct answer in full influence condition and full influence with expert support condition), and c) The energy company and residents together (correct answer in shared influence condition). In the shared influence condition and full influence with expert support condition, we further asked participants whether residents could ask experts from an energy company for advice, according to the text they read. The right answer was that they can ask for advice. Participants who wrongly answered the attention check questions were excluded from analysis. The attention check question resulted in 90.90% ($N$ = 70), 92.31% ($N$ = 72), 92.41% ($N$ = 73) valid response rate for the shared influence condition, the full influence condition and the full influence with expert support condition, respectively.[7]

### 3.1.4. Measures

***Manipulation check of public influence in decision making.*** In order to examine whether our manipulation of public influence worked, we asked the participants to indicate on a 7-point scale (ranging from −3 not at all to 3 very much), how much influence they thought residents in the area they live in have over the final decision about this project ($M$ = 0.99, $SD$ = 1.38).

***Acceptability.*** We used the same measures as in the pilot study of (1) **acceptability of the decision-making process** ($M$ = 1.36, $SD$ = 1.32, $\alpha$ = 0.88), (2) **acceptability of the final decision** ($M$ = 1.18, $SD$ = 1.38, $\alpha$ = 0.95), and (3) **acceptability of the project** ($M$ = 1.31, $SD$ = 1.46, $\alpha$ = 0.95).

***Explorative measures.*** We included two additional measures to explore whether providing expert support could have the potential benefits as we argued in the Introduction, to better understand why providing expert support could lead to higher public acceptability of the decision-making process and resulting decisions and renewable energy projects. Specifically, we explored whether providing expert support would enhance perceived expertise of the decision-making panel and enhance the perceived quality of the final decision taken by the decision-making panel. Moreover, we examined the extent to which these potential benefits are associated with higher acceptability of the decision-making process and resulting decisions and renewable energy projects. ***Perceived expertise of the decision-making panel*** was measured by asking the participants to indicate on a 7-point scale (ranging from −3 not at all to 3 very much), to what extent they think the decision-making panel: *has sufficient experience with wind energy projects*, and *has sufficient knowledge about wind energy projects*. We computed the mean scores on the two items; higher scores reflect higher perceived expertise of the decision-making panel ($M$ = 0.50, $SD$ = 1.53, $r$ = 0.85). We measured ***perceived quality of the final decision*** by asking the participants to indicate on a 7-point scale, to what extent they think the final decision about the wind energy project made by the decision-making panel would be *of very low quality* (-3) to *very high quality (3)* ($M$ = 1.07, $SD$ = 1.39).

## 3.2. Results

### 3.2.1. Manipulation check results

A one-way between-subjects ANOVA revealed a significant difference in perceived public influence across conditions, $F$ (2, 212) = 7.78, $p$

[5] The questionnaire was developed in English, and then translated into Dutch by a native Dutch speaker. One other native Dutch speaker checked and provided feedback for the translation of the Dutch questionnaire. Revisions were made wherever needed. The original Dutch questionnaire can be found in Supplementary Information B.

[6] Initial sample sizes were determined based on power analysis with medium effect size (0.25) and power (0.8), which resulted in an estimated total sample size of 159. We instructed the panel companies to reach at least 210 valid responses.

[7] The pattern of results did not change when all participants were included in the analysis.

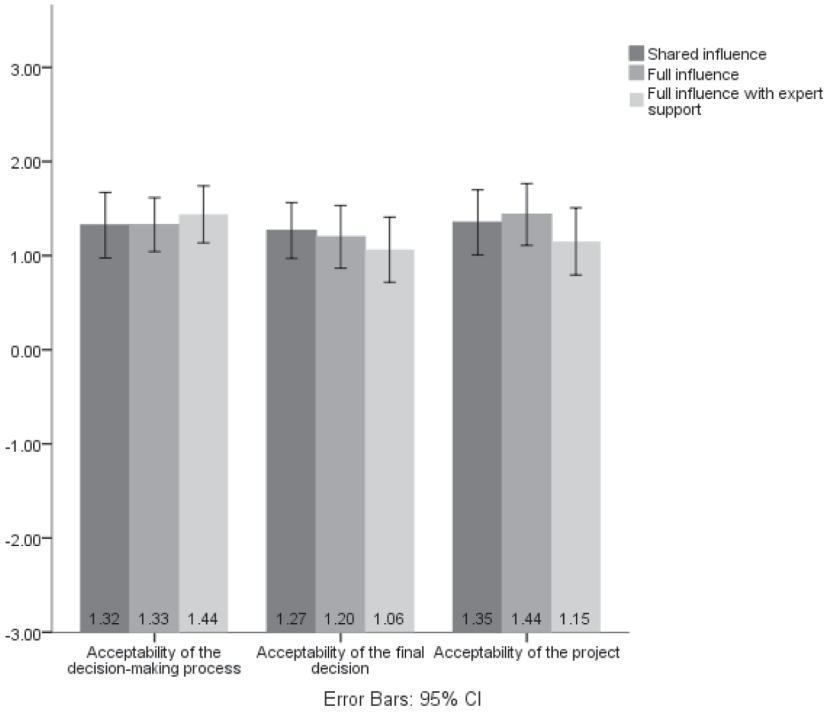


**Fig. 3.** Mean scores and standard deviations of acceptability of the decision-making process, acceptability of the final decision, and acceptability of the project (Study 1).

= .001, $\eta^2 = 0.068$. Post-hoc comparisons using LSD test showed that perceived influence was significantly higher when the public could have full influence, either without ($M = 1.01$, $SD = 1.48$; $p = .032$, 95% CIs [0.04, 0.93]) or with expert support ($M = 1.41$, $SD = 1.12$; $p < .001$, 95% CIs [0.44, 1.32]), than when the public and experts would make the final decision together ($M = 0.53$, $SD = 1.40$). There was no significant difference between both full influence conditions ($p = .076$, 95% CIs [−0.84, 0.04]). These results suggest that our manipulation of public influence was successful.

### 3.2.2. Main results

A one-way between-subjects ANOVA revealed that there was no significant difference in acceptability of the decision-making process across conditions, $F$ (2, 212) = 0.17, $p = .842$, $\eta^2 = 0.002$. This suggests that providing expert support for full influence did not enhance acceptability of the decision-making process compared to shared influence or full influence without expert support (Fig. 3). Similarly, one-way between-subjects ANOVAs revealed that there was no significant difference in acceptability of the final decision across conditions, $F$ (2, 212) = 0.40, $p = .673$, $\eta^2 = 0.004$ and no significant difference in acceptability of the project across conditions, $F$ (2, 212) = 0.74, $p = .478$, $\eta^2 = 0.007$ (see Fig. 3).

### 3.2.3. Explorative analyses

A one-way between-subjects ANOVA revealed a significant difference in perceived expertise of the decision-making panel across conditions, $F$ (2, 212) = 17.87, $p < .001$, $\eta^2 = 0.144$. Post-hoc comparisons using a LSD test showed that perceived expertise of the decision-making panel was highest when citizens and experts would make the final decision together, compared to when citizens could have full influence either with ($p < .001$, 95% CIs [0.77, 1.71]) or without expert support ($p < .001$, 95% CIs [0.76, 1.70]). Interestingly, we did not find that the possibility to consult experts increased the perceived expertise of the decision-making panel comprising only residents, compared to the shared influence condition ($p = .972$, 95% CIs [−0.46, 0.47]) (Fig. 4).

A one-way between-subjects ANOVA revealed that, overall, there was no significant difference in perceived quality of the final decision across conditions, $F$ (2, 212) = 2.68, $p = .071$, $\eta^2 = 0.025$. Yet, as illustrated in Fig. 4, perceived quality of the final decision appeared higher when citizens and experts would make the final decision together (i.e., shared influence) compared to when citizens would make the final decision and could consult experts (full influence with expert support); post-hoc comparisons using LSD test showed that this difference was significant ($p = .022$, 95% CIs [0.08, 0.99]). This result suggests that people think the quality of decisions would be higher if experts and the

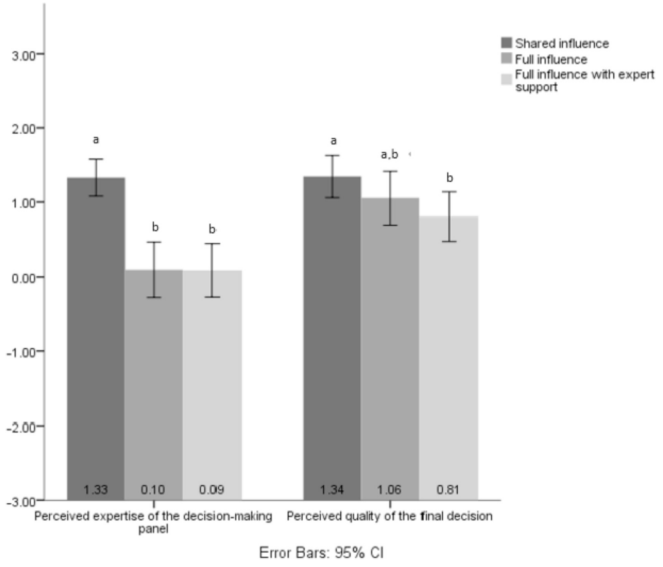


**Fig. 4.** Mean scores and standard deviations of perceived expertise of the decision-making panel and perceived quality of the final decision (Study 1) Note: different letters (a, b) indicate significant differences in the mean scores within each measure ($\alpha < 0.05$); the mean scores with the same letter do not significantly differ from each other within each measure.

**Table 3**
Relationship (Pearson's correlations) between potential benefits of expert support and public acceptability (Study 1).

| | Perceived quality of the final decision | Acceptability of the decision-making process | Acceptability of final decision | Acceptability of project |
|---|---|---|---|---|
| Perceived expertise of decision-making panel | 0.64** ($p <$ .001) | 0.37** ($p <$ .001) | 0.56** ($p <$ .001) | 0.41** ($p <$ .001) |
| Perceived quality of the final decision | | 0.56** ($p <$ .001) | 0.84** ($p <$ .001) | 0.67** ($p <$ .001) |

**$p < .001$ (p-values are reported in brackets).

public would make decisions together rather than when experts would merely advise citizens.

*3.2.3.1. Relationships between perceived expertise, perceived decision quality, and public acceptability.* We next explored whether perceived expertise of the decision-making panel and perceived quality of the final decision are related to public acceptability. Pearson's correlations (Table 3) showed that both higher perceived expertise of the decision-making panel and particularly higher perceived quality of the final decision were related to higher acceptability of the decision-making process, acceptability of the final decision and acceptability of the renewable energy project.

### 3.3. Discussion

The results showed that public acceptability of the decision-making process, the final decision and the energy project was not higher when the public could have full influence and could consult experts, compared to when the public and experts would make the final decision together and compared to full influence without expert supports. The explorative analyses suggest that one possible reason for this finding could be that providing expert support for a decision-making panel comprising only citizens did not yield the expected benefits: it did not result in higher perceived expertise of the decision-making panel, nor in higher perceived quality of the final decision in our study. Still, higher perceived expertise of the decision-making panel and higher perceived quality of the final decision were associated with higher acceptability of the decision-making process and resulting decisions and projects. These findings suggest that full influence (i.e., citizen control) did not result in higher acceptability of the decision-making process, the resulting decisions, and the wind energy project compared to shared influence (i.e., partnership), even when expert support was provided.

## 4. Study 2: Effects of public influence and expert support on public acceptability in China

Study 2 tests if the findings in Study 1 can be replicated in an East-Asian country, China.

### 4.1. Participants

We tested our reasoning via an online questionnaire study with respondents from a pre-recruited Chinese panel[8]. Study 2 followed the exact same procedure and design as Study 1. The questionnaire was in Chinese[9]. Applying the same attention check as in Study 1, we received 244 valid responses for further analyses[10] (83 valid participants for the shared influence condition, 78 valid participants for the full influence condition, 83 valid participants for the full influence with expert support condition), of which 116 were male and 128 were female, with the mean age of 30 years ($SD = 7.89$). See Supplementary Information for detailed demographic information.

We included the same measures as in Study 1. We included the single measure of the manipulation check of perceived public influence ($M = 1.82$, $SD = 1.01$). We computed the mean scores of the three items reflecting public acceptability of the decision-making process ($M = 1.55$, $SD = 1.08$, $\alpha = 0.73$), the three items reflecting public acceptability of the final decision ($M = 1.63$, $SD = 1.03$, $\alpha = 0.79$), and the four items reflecting public acceptability of the project ($M = 1.76$, $SD = 1.11$, $\alpha = 0.85$). We also computed the mean scores on the two items reflecting perceived expertise in the decision-making panel ($M = 0.47$, $SD = 1.72$, $r = 0.87$). We again included the single item measure of perceived quality of the final decision ($M = 1.34$, $SD = 1.35$).

### 4.2. Results

#### 4.2.1. Manipulation check results

A one-way between-subjects ANOVA revealed a significant difference in perceived public influence across conditions, $F(2, 241) = 3.67$, $p = .027$, $\eta^2 = 0.030$. Post-hoc comparisons using LSD test showed that perceived public influence was significantly higher when the public could have full influence either without ($M = 1.95$, $SD = 1.07$; $p = .020$, 95% CIs [0.06, 0.68]) or with expert support ($M = 1.94$, $SD = 0.94$; $p = .021$, 95% CIs [0.06, 0.67]), than when the public and experts would make the final decision together ($M = 1.58$, $SD = 0.99$). This suggests that our manipulation of public influence in decision making was again successful.

#### 4.2.2. Main results

One-way between-subjects ANOVAs revealed that there were no significant differences in acceptability of the decision-making process across conditions, $F(2, 241) = 1.07$, $p = .346$, $\eta^2 = 0.009$, and no significant differences in acceptability of the project across conditions, $F(2, 241) = 1.65$, $p = .194$, $\eta^2 = 0.014$. Providing expert support for full influence did not enhance acceptability of the decision-making process and acceptability of the project compared to shared influence or full influence without expert support (Fig. 5).

[8] The participants recruitment strategies were identical in Study 1 and 2, namely participants were from pre-recruited panel companies. We employed different local panel companies in each country, given the companies' good reputation for data collection in each country. The differences in sample characteristics between the two countries are mainly due to the pre-recruited panel differences. Specifically, it is a common phenomenon for pre-recruited Chinese panels that most often young and well-educated people participate.

[9] The same English questionnaire was translated into Chinese (Mandarin) by a native Chinese speaker. One other native Chinese speaker checked and provided feedback on the translation. Revisions were made wherever needed. Importantly, changes were made consistently in the Dutch and Chinese questionnaires. The Chinese translation of the questionnaire can be found in Supplementary Information C.

[10] The same attention check questions were used as in Study 1. Participants who wrongly answered the attention check questions were excluded from analysis. This time, invalid data were excluded by the panel company and were not provided to researchers, and thus we were unable to calculate valid response rates for each condition nor to provide attention check results.

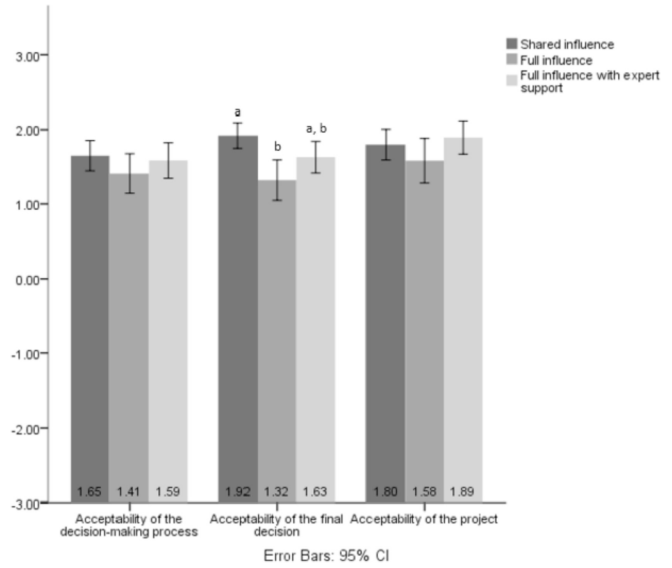


**Fig. 5.** Mean scores and standard deviations of acceptability of the decision-making process, acceptability of the final decision, and acceptability of the project (Study 2) Note: different letters (a, b) indicate significant differences in the mean scores within each measure ($\alpha < 0.05$); the mean scores with the same letter do not significantly differ from each other within each measure.

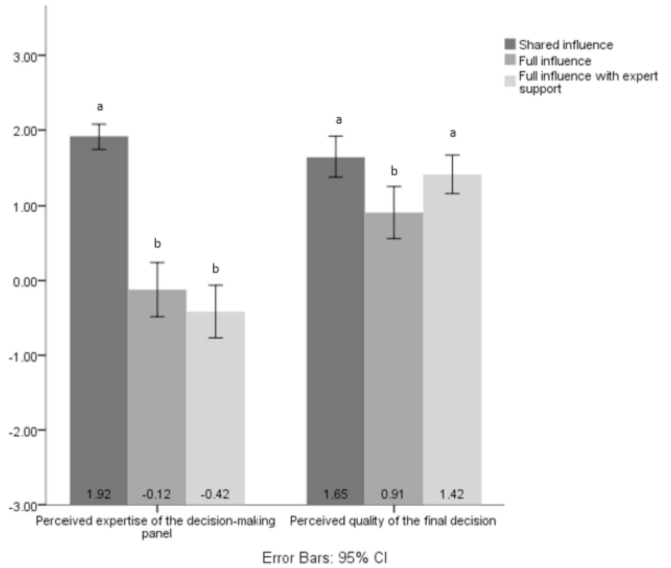


**Fig. 6.** Mean scores and standard deviations of perceived expertise of the decision-making panel and perceived quality of the final decision (Study 2) Note: different letters (a, b) indicate significant differences in the mean scores within each measure ($\alpha < 0.05$); the mean scores with the same letter do not significantly differ from each other within each measure.

Yet, a one-way between-subjects ANOVA revealed a significant difference in acceptability of the final decision across conditions, $F$ (2, 241) = 7.18, $p$ = .001, $\eta^2$ = 0.056. As illustrated in Fig. 5, post-hoc comparisons using the LSD test indicated that acceptability of the final decision was lowest when citizens could have full influence but could not consult experts, which was significantly lower than when people would make decisions together with experts ($p$ < .001, 95% CIs [−0.91, −0.29]), and marginally significantly lower than when people would make decisions themselves and could ask experts for support ($p$ = .051, 95% CIs [−0.62, 0.001]). We did not find acceptability of the final decision to differ between the shared influence and the full influence with expert support conditions ($p$ = .064, 95% CIs [−0.02, 0.60]). Interestingly, there was a trend (but non-significant) towards acceptability of the final decision to be higher in the shared influence condition compared to the full influence condition either with or without expert support. The result suggests that the final decisions are more acceptable when people believe the experts have some influence over decisions than when experts were not involved in the decision making.

#### 4.2.3. Explorative analyses

A one-way between-subjects ANOVA revealed a significant difference in perceived expertise of the decision-making panel across conditions, $F$ (2, 241) = 70.28, $p$ < .001, $\eta^2$ = 0.368. Post-hoc comparisons using the LSD test showed that people thought the decision-making panel had more expertise when citizens and experts would make the final decision together compared to when citizens would have full influence with ($p$ < .001, 95% CIs [1.91, 2.75]) and without expert support ($p$ < .001, 95% CIs [1.61, 2.46]) (Fig. 6). This means that people perceived the expertise of the decision-making panel to be highest when experts would take decisions together with the public.

A one-way between-subjects ANOVA revealed a significant difference in perceived quality of the final decisions across conditions, $F$ (2, 241) = 6.57, $p$ = .002, $\eta^2$ = 0.052. As illustrated in Fig. 6, post-hoc comparisons using LSD test showed that perceived quality of the final decision was highest when citizens and experts would make the final decision together; it was significantly higher than when citizens would have full influence but could not consult experts ($p$ < .001, 95% CIs [0.33, 1.15]). Providing expert support for full influence significantly increased the perceived quality of the final decision compared to full influence without expert support ($p$ = .015, 95% CIs [0.10, 0.92]), but did not significantly increase perceived quality of the final decision compared to shared influence ($p$ = .266, 95% CIs [−0.63, 0.18]).

*4.2.3.1. Relationships between perceived expertise, perceived decision quality, and public acceptability.* Pearson's correlations (Table 4) showed that, again, both higher perceived expertise of the decision-making panel and particularly higher perceived quality of the final decision were significantly related to higher acceptability of the decision-making process, acceptability of the final decision and acceptability of the renewable energy project.

### 4.3. Discussion

Result of Study 2 were in general comparable to results of Study 1. Specifically, acceptability of the decision-making process, the final decision and the project was not higher when the public would make the final decision themselves and could consult experts compared to when the public and experts would make the final decision together. Again, providing expert support in the full influence condition did not increase the perceived expertise of citizens involved in decision making, and did

**Table 4**
Relationship (Pearson's correlations) between potential benefits of expert support and public acceptability (Study 2).

| | Perceived quality of the final decision | Acceptability of the decision-making process | Acceptability of final decision | Acceptability of project |
|---|---|---|---|---|
| Perceived expertise of decision-making panel | 0.43** ($p$ < .001) | 0.25** ($p$ < .001) | 0.36** ($p$ < .001) | 0.17* ($p$ = .008) |
| Perceived quality of the final decision | | 0.57** ($p$ < .001) | 0.77** ($p$ < .001) | 0.61** ($p$ < .001) |

*$p$ < .05, **$p$ < .001 (p-values are reported in brackets).

not increase perceived quality of the final decision compared to the shared influence condition. Moreover, results again showed that higher perceived expertise of the decision-making panel and perceived quality of the final decision were associated with higher public acceptability of the decision-making process and resulting decisions and renewable energy projects. In conclusion, full public influence (i.e., citizen control) did not lead to higher acceptability of the decision-making process and the resulting decisions of the wind energy project, compared to shared influence (i.e., partnership), even when expert support is provided. The decision-making panel comprising both experts and citizens was again evaluated as having most expertise and most capable to take high quality decisions.

## 5. General conclusion and discussion

We conducted two experimental studies to examine the effects of shared influence versus full influence (either with or without expert support) on public acceptability of the decision-making process, resulting decisions and renewable energy projects in the Netherlands and China. We extended previous research by (1) testing under which conditions (i.e., with vs. without expert support) full influence (e.g., citizen control) enhances public acceptability compared to shared influence (e.g., partnership), (2) employing an experimental design which enables us to test the causal effect of public influence in decision making on public acceptability of the decision-making process and resulting decisions and projects, and (3) conducting the study in different contexts, namely in a Western European country (i.e., the Netherlands) and an East-Asian country (i.e., China), to test the generalisability of the findings.

A pilot study replicated the previous findings from the literature that having at least some influence leads to higher acceptability of the decision-making process compared to having no influence at all [9,21,22]. Extending previous work, we experimentally demonstrated that perceiving the public would have influence indeed causes higher public acceptability of the decision-making process compared to perceiving the public having no influence at all. This also provides congruent empirical evidence to the literature which proposes that meaningful public participation that incorporates public input in decision making would be more beneficial for public acceptability compared to public participation processes where the public is only informed about the project (e.g., [25]).

We hypothesised that compared to shared influence (e.g., partnership), full influence (e.g., citizen control) can lead to higher public acceptability of the decision-making process, of the resulting decisions and energy projects when citizens involved in decision making could consult experts. Specifically, we hypothesised that people may assume that the public does not have sufficient expertise to make high-quality decisions on energy projects, and providing expert support would enhance people's perceived expertise of the decision-making panel and the perceived quality of decisions to be taken by the panel [51,52]. Yet, contrary to our expectation, full public influence (i.e., citizen control) did not lead to higher acceptability of the decision-making process, the resulting decisions, and the wind energy project, compared to shared influence (i.e., partnership), even when expert support is provided. This could be due to that we did not find that consulting experts increases the perceived expertise of the decision-making panel who would take decisions. In other words, the decision-making panel comprising both experts and citizens was evaluated as having more expertise and being more capable to take high quality decisions, compared to a decision-making panel compromising only citizens, even when those citizens could consult experts. It is possible that people think experts' knowledge will not be well transferred to citizens, or that citizens will not (be able to) effectively incorporate experts' knowledge when experts would merely advise citizens, and that better decisions are made when the public makes decisions together with experts. Future research is needed to study what are effective strategies to enhance perceived expertise of a decision-making panel comprising only citizens and to increase perceived quality of the decisions to be taken by such a panel, and whether this would increase public acceptability of the decision-making processes, the resulting decisions, and energy projects.

In Study 1 and 2, we only included a shared influence condition and full influence (either with or without expert support) conditions, but we did not include a condition in which people would have no influence at all (e.g., only informing the public about the project). This is because our main aim was to see whether full influence enhances acceptability above and beyond shared influence, but not to compare full influence with no influence at all. Yet, future research could test if having full influence (e.g., citizen control) may even backfire – decrease acceptability of the resulting decisions and energy projects – compared to no influence at all, by systematically varying all different amounts of influence people can have in participatory procedures about renewable energy projects, for example ranging from no influence, to little influence, to shared influence and to full influence.

In line with our expectation, we found that both higher perceived expertise of the decision-making panel and higher perceived quality of the decisions enhanced public acceptability of the decision-making process, acceptability of the final decision and acceptability of the project. Noteworthy, perceived quality of the decisions was more strongly related with acceptability of the decision-making process, of the decision to be taken and of the project to be developed, than perceived expertise of the decision-making panel, in both countries. This is probably because perceived expertise indicates if those involved in the decision-making panel have sufficient knowledge, but this does not guarantee that the knowledge will be used effectively when taking decisions. Moreover, perceived quality of decisions may depend on many aspects, such as technical quality, using reliable information, as well as incorporation of different values in decision making, among others. This is also reflected in our finding that perceived expertise and quality of decisions are positively, but not very strongly, related in both studies. Hence, the decision-making process, the resulting decisions and the project to be developed are particularly more acceptable if people think that decisions makers will use their expertise in a way that can best serve public interests.

We defined "expert support" as coming from a hypothetical energy company and we described the company as highly competent across conditions. Yet, people's trust in different organizations may differ [53], and this may affect if providing such expert support would increase project acceptability. For example, people may find it less important to consult experts when the responsible agent is trustworthy. Future research could test whether similar or different results are found when citizens take decisions together with (or merely consult) experts from different organizations, such as the government, research institutes (e.g., universities), and NGOs.

In general, the patterns of results were very consistent in the Netherlands and China. Our findings in both countries challenge the common assumption that the more public influence, the higher project acceptability, and imply that public participation may have similar effects in both countries. This contradicts earlier research suggesting that people in the Netherlands may want to have more influence in decision making than people in China [50], which would imply that public participation may have different effects on public acceptability in both countries. Future research could test whether similar results would be found in other countries and cultures.

It worth noticing that the respondents evaluated hypothetical energy projects, implying that no actual decisions were taken and the energy projects would not be actually implemented. This might have made it relatively difficult for the respondents to evaluate how acceptable they would find the resulting decisions and energy projects. Also, the respondents did not actually experience the extent to which the public can influence and shape decisions through public participation, which could affect the results. Hence, the results on acceptability of decisions and projects should be interpreted with care. Notably, we employed

experimental design to control for other potential factors that may affect project acceptability as to rule out alternative explanations, and to establish the cause and the effect between public influence and project acceptability. We provided the first evidence to challenge the common assumption that the more public influence the higher project acceptability. Yet, the strength of experimental designs comes with the drawback that it is a simplification of reality and presenting hypothetical situations without real consequences. Future research is needed to test our hypotheses with real energy projects and real public participation procedures where actual decisions will be taken and in which many other factors may be at play, by employing other research designs, such as correlational studies, longitudinal studies, and field (quasi) experiments, in order to enhance the external validity of our findings. Moreover, we tested our hypotheses for specific energy projects (e.g., wind energy project in Study 1 and 2). Research suggests that public participation has similar effects on acceptability of different types of energy projects [9,22]. Still, future studies are needed to test our hypotheses with other types of energy projects to draw firmer conclusions about the generalizability of our findings.

We examined the effect of shared influence and full influence (either with or without expert support) on public acceptability. Yet, the aspects of the project that people could influence may also matter for public acceptability of the decision-making process and the final decision and the resulting project. Specifically, being able to influence major aspects of the project that have important implications for people's life and living environment (e.g., the location of a wind park) may increase public acceptability more compared to only being able to influence some minor aspects of the project (e.g., color of wind turbines) [13]. In our studies, we kept the aspects of the project people could influence constant across conditions, by indicating that people could influence all aspects of the project. Future studies could test how the amount of influence and which aspects of the project people can influence work together in affecting public acceptability, to test whether the effect of amount of influence on project acceptability depends on which aspects people can influence, and the other way around. For example, it may be that more public influence backfires and even decreases public acceptability, if the influence can only be exercised over minor decisions, because it implies that people invest time in participation but still cannot guarantee that their major interests and concerns are addressed. Similarly, public acceptability may be higher if people could influence aspects that are truly important to them, even if they would not have full control over those aspects and do not take decisions themselves, because people think the likelihood that their major concerns are addressed is already high. Future research could explore these possibilities.

In this paper, we focused on the instrumental arguments for increasing public influence in energy projects, namely increasing public acceptability of energy projects [54]. Interestingly, we showed that full influence (e.g., citizen control) did not result in higher public acceptability of the energy projects compared to shared influence (e.g., partnership), even when expert support was provided. Yet, this does not mean that citizens should not have (full) control over decision making about energy projects, as higher amounts of public influence over decision making may have other benefits. For example, normative arguments stress that public participation is an end in itself [12], and it is the citizens' right in a democratic society to be engaged in decision making about affairs that impact them [55,56]. In addition, substantive arguments stress that diverse citizens can not only bring in multifaceted local knowledge that experts may otherwise miss, but also bring in a greater range of perspectives and concerns, and thereby public participation could help to reach better quality decisions about renewable energy projects [57]. Future research could look at how different amounts of public influence can facilitate the realizations of these benefits of public participation.

Our findings have important practical implications. First and foremost, we found that people might find the decision-making process less acceptable when not giving any influence to the public, and this finding is in line with other correlational studies in which people evaluate real-life renewable energy projects [9,20,21]. Yet, providing more influence to citizens did not necessarily lead to higher public acceptability of the decision-making process, of the resulting decisions and energy projects in our studies. This is important for practitioners to bear in mind when developing energy policies, particularly given the increasing advocacy of more public influence in decision making about renewable energy projects [12]. For example, citizen control could take place in community energy initiatives where citizens decide about the project, and there may be more efforts for citizen control as energy systems decentralize. Our research suggests that people may not necessarily favor citizens taking the decisions and this may not increase acceptability of the project. Future research is needed to test if our findings can be replicated with real-life energy projects where citizens have real control over the decisions. Moreover, people are more likely to positively evaluate the decision-making processes around energy projects when they believe those involved in the decision-making panel have higher expertise, and when they believe the decisions to be taken would be of higher quality. Practitioners therefore need to take care that different agents (e.g., public representatives, experts) involved in decision making are believed to have sufficient expertise and try to maximise the quality of the decisions to be taken. Importantly, the decisions may not only need to be of high technical quality, but also need to represent different values and concerns of the public [58], to enhance public acceptability of the decision-making process and the project.

To conclude, this research tested the effect of shared influence versus full influence (either with or without expert support) on public acceptability of the decision-making process, the resulting decisions and energy projects. Our findings provide first evidence to challenge the common assumption that the more influence the public has in the decision making, the more acceptable they find energy projects. Rather, our findings suggest that it is important for citizens to have some, but not necessarily full, influence in decision making, and that practitioners need to secure that those involved in decision making (e.g., public representatives, experts) are believed to have sufficient expertise to make high quality decisions, in order to enhance public acceptability of the decision-making processes and resulting energy projects.

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## 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.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.erss.2021.102286.

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