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Original research article

Pipelines and power: Psychological distress, political alienation, and the breakdown of environmental justice in government agencies' public participation processes

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ABSTRACT

Environmental health research has demonstrated that living near industrial activity is associated with increased stress, depressive symptoms, and feelings of powerlessness. Little is known, however, about the effects of new natural gas pipelines—or the institutional processes dictating their approval and construction—on the mental health of local residents. Through our analysis of a mail survey, an online survey, and a set of semi-structured interviews, we examine how engagement with public participation processes associated with new interstate natural gas pipelines affects mental health. Our results suggest that the public participation opportunities offered by regulatory agencies during the pipeline certification process are primarily performative, and we find that many of the people who have taken part in these performative public input opportunities experience psychological distress, stress-activated physical health effects, and a loss of trust in government institutions. We argue that when people engage in public participation processes that have little or no effect on agency decision-making, it not only disempowers, but can *harm* those individuals and erode their trust in government institutions. Furthermore, we contend that providing the public with participation opportunities that are merely performative, with little ability to influence decision-making outcomes, is a violation of both procedural and recognition justice, two of the core tenets of environmental justice.

1. Introduction

Natural gas production in the United States nearly doubled in fifteen years, expanding from 18.9 trillion cubic feet in 2005 to 35.2 trillion cubic feet in 2020 [1]. This increase in production prompted a corresponding surge in proposals for new interstate natural gas transmission pipelines: between 1999 and 2019, a total of 23,773 pipeline miles were built in the United States [2]. Although pipeline developers and the Federal Energy Regulatory Commission claim that this increased capacity is necessary for meeting the United States' energy demands, the amount of new natural gas pipeline capacity approved during that twenty-year time period "is nearly double the all-time record for gas use [in the U.S.] in a single day" [2,p. 1], suggesting that the current pipeline build-out has more to do with finding markets for natural gas companies' gas reserves than meeting the nation's energy needs.

Many of the communities through which these new pipelines have been routed have intensely opposed them, as evidenced through the thousands of comments they have filed urging the Federal Energy Regulatory Commission (FERC)—the agency responsible for regulating the interstate transmission of natural gas—to reject these new pipelines. The primary reasons for the public's opposition have included anger over pipeline companies' right to seize land through eminent domain, anxiety over potential pipeline leaks and explosions, erosion and sedimentation of waterways, environmental justice concerns, and the urgency of addressing climate change [3]. Despite this widespread public opposition, between 1999 and 2020, FERC granted pipeline companies the right to use eminent domain in more than 99 % of cases [4]. The fact that FERC has approved nearly all of the pipeline projects that have been brought before it has led many to view this agency as a rubber stamp agency—one that is working in partnership with the natural gas industry

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to expand fossil fuel infrastructure for the primary purpose of increasing industry profits.

Environmental health research has demonstrated that living near industrial activity is associated with increased stress, depressive symptoms, and feelings of powerlessness [5–7]. Importantly, however, scholars have found that it is not just the magnitude of industrial activity that matters; *institutional decision-making processes* also play a significant role in the mental health effects of industrial activity on local populations [6]. In this study we examine the regulatory processes associated with the permitting and construction of natural gas pipelines, focusing in particular on people's experiences with regulatory agencies' public input opportunities. We ask: How does engagement with public participation processes associated with new interstate natural gas pipelines affect the mental health of those who take part in these processes? To answer this question, we analyze results of three different data-collection efforts. The first is a 92-question mail survey with 783 residents living in 10 of the counties in Virginia and West Virginia through which the Mountain Valley Pipeline (MVP)—a 42-in., 303-ft long natural gas pipeline—has been under construction since 2018; second is an online survey we conducted with 244 residents throughout the United States who have been affected by FERC-approved natural gas pipelines, and third are 13 semi-structured interviews conducted with landowners on or near the MVP route who formally submitted comments about the pipeline project during public commenting periods.

Our results suggest that the public participation opportunities offered by regulatory agencies during the pipeline certification process are primarily *performative*, rather than substantive. Moreover, we find that those who have taken part in these opportunities have experienced negative mental health outcomes, stress-activated physical health effects, and a loss of trust in government institutions. We argue that when people engage in public participation processes that have little or no effect on agency decision-making, it not only disempowers, but can *harm* these individuals and erode their trust in government institutions. Furthermore, we contend that providing the public with participation opportunities that are merely performative with little ability to influence decision-making outcomes is a violation of both procedural and recognition justice, two of the core tenets of environmental justice.

2. Literature review

2.1. The history of public participation in government decision-making

The incorporation of public comment opportunities into federal agency rulemaking was institutionalized in the United States through the Administrative Procedure Act (APA) of 1946 [8]. The APA stipulated the procedures federal agencies must follow when developing and enacting policies, requiring that notices of proposed rulemaking be published in the *Federal Register* for the public to read and comment on before those rules become finalized [9]. The APA's "notice and comment" requirements ensure that the public has access to information about agency actions and that they are able to formally comment on those actions. However, the APA "did not call for public involvement in the actual decision-making itself," limiting the impact that this public input could have [8,p. 107].

The National Environmental Policy Act (NEPA), which was passed by Congress in 1969, heightened the public involvement requirements for federal agencies' decision-making on actions that could significantly affect the environment [10]. NEPA also mandated that federal agencies must communicate with each other and with the public about the possible "environmental, social, and economic consequences" of proposed policies or other actions [10,p. 38]. Thus, while "the APA required agencies to make relevant documents available to the public," the passage of NEPA ensured that the public would not only have access to information from federal agencies, but that it would also have "the opportunity to be heard after receiving this information and before decisions [are] made" [10,p. 38]. In other words, it was not until the passage of NEPA that the public had the potential to influence federal agencies' decision-making on policies and programs affecting the environment.

As the National Research Council has pointed out, however, NEPA does not require that agency personnel actually *incorporate* the input they receive from the public into their decision-making, nor are they required to "explain why they did not" [10,p. 38]. Ingram and Ullery further clarify this point, noting that when NEPA was passed, "Elaborate procedures were adopted to gather information without establishing mechanisms to integrate it into terminal decisions" [17,p. 133]. Indeed, as legal scholar Sam Kalen has argued, NEPA has been interpreted to be solely "a 'procedural' statute [that] does not demand any substantive outcome" [11,p. 484].

Because of this lack of guidance on what to do with public input once it has been gathered, the implementation of NEPA's public participation requirements has varied widely among federal agencies. As the authors of the National Research Council's *Public Participation in Environmental Assessment and Decision Making,* explain,

> Agencies may, within their discretion, be restrictive about public input, inviting it only as applicable laws require, or expansive, inviting and using public input at every point in the process if doing so is not legally prohibited (e.g., where it would delegate statutory responsibility). In exercising this discretion, agency officials may or may not be explicit in stating the purposes they intend public input to serve. This situation leaves considerable room for ambiguity, misunderstanding, and contestation over who should participate, how, when, and with what kind and degree of influence [10,p. 43]

Thus, in some cases, public input may have limited—or even no—effect on the outcome of a federal agency's decision-making, despite what can amount to tremendous amounts of time and energy that some members of the public devote to engaging in public participation processes. In these cases, public participation opportunities can be understood to be *performative*, rather than *substantive*.

2.2. Performative public participation and environmental injustice

Substantive public participation processes have a clear mechanism in place for the public to influence policy or planning outcomes. On the other hand, performative public participation processes invite members of the public to formally state their views on a project or policy without providing a corresponding mechanism for that input to significantly influence decision-making [17; see also 11,12]. Unfortunately, the public typically does not realize when they have been invited to participate in an input process that is primarily performative and often "assume that their input will have more influence than is possible" [10, p. 45]. Given both legal constraints and agencies' differing levels of "willingness to share responsibility" for decision-making, agency staff and members of the public may have disparate understandings about the purpose of public participation [10,p. 45].

As a result of this ambiguity, members of the public may not realize the parameters within which their input can actually affect policy. For example, in a study of the public commenting process associated with U. S. Forest Service Environmental Impact Statements, De'Arman found that there is a disconnect between how the public uses the Environmental Impact Statement commenting process and the limited ways in which those comments can be incorporated into Forest Service plans. Most of the public comments fall "outside of agency personnel decision-making capacity and thus, personnel respond to comments in ways that deny their worth and block those concerns from project agenda setting" [12,p. 1].

In some cases, agency staff may be "deliberately vague" about how public input will be used in an effort to boost "acceptance of agency decisions while promising little in return" [10,p. 45]. In other cases, well-intentioned agency staff may communicate transparently about their intentions for using public comments but then be "overruled at the

end of the process by higher-level officials" who do not share the same perspectives on the value of public input [10,p. 45].

Regardless of the mechanism by which it occurs, it can be argued that excluding the concerns of a sizeable portion of the public from permitting processes is a violation of both recognition and procedural justice, two of the core tenants of environmental justice. There is a tendency among policymakers to equate environmental justice only with distributive justice, which—within the energy development realm—means ensuring equity in the allocation of burdens and benefits of energy infrastructure or policies [13]. However, environmental justice is more than simply how and where burdens and benefits are distributed. It also requires that the perspectives of institutionally subordinated and historically marginalized groups are valued (recognition justice); that all affected parties are provided equitable access to and opportunities for influencing decision-making (procedural justice); and that past harms against marginalized groups are acknowledged and that efforts are made to correct those harms (reparative justice) [13,14]. As Nancy Fraser has argued, recognition justice is crucial to any efforts oriented toward attaining justice [15]. Thus, it can be concluded that public participation opportunities that are performative, rather than substantive, operate against environmental justice.

Researchers have argued that participatory processes in planning can sometimes result in *less* democratic outcomes [16], and some suggest that the use of public participation can help lubricate unpopular decisions by "creating…the illusion of substantive impact" [17,p. 123]. As Steven Lukes [18] has argued, power does not simply operate through clear and observable expressions of authority; it also manifests through more subtle and concealed mechanisms, such as through setting the "rules of the game" or parameters of debate. This manifestation of power (Lukes' second dimension) can also be understood as "meta-power," which Burns and Hall describe as "power over power" [19]. Those with meta-power over a particular system are able to structure the confines within which other types of power are able to operate, often by influencing the overarching frameworks or practices governing that system [20].

Moreover, some performative participation opportunities may have been intentionally designed to act as a release valve for aggrieved members of the public, defusing the threat of resistance by "consum[ing] the energies of [participants] so they do not engage in actions that might actually influence outcomes" [21,p. 666]. As Ingram and Ullery have explained, "Even if their advice is rejected," people who engage in participation opportunities "may feel that they have at least had their day in court and [will be] more likely to accept policy decisions" [17,p. 123].

National Research Council scholars further contend that "by absorbing [the public's] time and energy and even by building unwarranted trust," public participation processes can limit people's actions to those that are within the agency's control [10,p. 53]. As they note, individuals who are focused on these agency-directed forms of participation "may be less likely to lobby with legislative bodies, bring lawsuits, pursue their goals through other agencies, or otherwise deploy strategies of influence outside the formal public participation process" [10,p. 53]. Public participation processes may also "co-opt, localize, and contain or channel conflicts that would otherwise influence agency actions" [10,p. 53]. Indeed, some scholars have even gone so far as to argue that federal agencies' public participation mandates were implemented under NEPA *specifically* for the purpose of averting a crisis of legitimacy during the late 1960s, when public trust in natural resource managers had reached a low point due to widespread concern over industry-caused pollution [22]. Because decisions that are made with public involvement may appear to be more legitimate—regardless of whether that public input actually influences decision-making outcomes—NEPA's participation requirements may have helped restore some degree of trust in government agencies, at least for a time.

What are the consequences of performative public participation on the people who devote significant amounts of time and energy engaging in these processes? Before examining the micro-level consequences of performative public participation associated with the permitting of new natural gas pipelines, we first provide an overview of the extent of the natural gas pipeline buildout in the United States, as well as the known mental health impacts of industrial development on nearby communities.

2.3. The buildout of natural gas pipelines in the United States

According to the U.S. Energy Information Association, the United States' existing natural gas network includes approximately 3 million miles of pipelines [See Fig. 1] [23].

In addition to the network shown in Fig. 1, there are more than 7200 miles of natural gas pipeline projects that are currently pending (including 2527 miles of natural gas pipelines that are approved, under construction or partially or fully completed but not yet in service; 3034 miles of pipelines that have been announced or that are in the application or pre-application stages; and 1723 miles of natural gas pipelines that are on hold) [25].

Pipeline building is a lucrative business. FERC allows pipeline companies a 14 % return on equity (ROE) for new pipelines, a rate that is significantly higher than other types of utility investments [26]. In other words, pipeline developers and their investors are not only able to recoup the costs of pipeline construction, but they are also entitled to an additional return. This practice has "incentivize[d] the building of new infrastructure over the efficient use of existing pipelines," and it has also meant that affiliate utility companies' captive customers are often straddled with increased rates in order to meet the FERC-sanctioned 14 % ROE [26,p. 14]. As FERC Commissioner Richard Glick warned in his dissent to the denied rehearing of the Southgate Extension of the Mountain Valley Pipeline in 2020, granting this pipeline a 14 % ROE for its investors "will only encourage the overbuilding of the pipeline system at customers' expense" [27].

Financing pipeline investors' profits through increasing utility rates for consumers is facilitated by the "self-dealing contracts" that pipeline developers often make with affiliate gas or electric utility companies [26]. These companies—which share a parent company with the pipeline developer— sign a long-term contract (called a "precedent agreement") committing to buy natural gas capacity from the pipeline. As the Environmental Defense Fund argued in its 2021 lawsuit against FERC,

> The essence of this financing structure is to take a cost pass-through for a retail gas or electric distribution utility—a contract for natural gas transportation services—and pay those transportation fees to an affiliated pipeline developer entitled to accrue return on its investment from that same revenue. Thus ratepayer costs, which may not be justified by ratepayer demand, are being converted into shareholder return [28].

This statement points to another factor that has been cited as contributing to pipeline over-building: FERC has historically permitted precedent agreements made with affiliated companies to serve as sufficient evidence of market demand for added natural gas capacity [29]. As mandated by the Natural Gas Act of 1938 and the Certificate Policy Statement of 1999, FERC must determine that a new or expanded natural gas pipeline project "is or will be required by the present or future public convenience and necessity" before that project can be approved [30]. Numerous attorneys, advocacy groups, and scholars have argued that allowing precedent agreements—rather than market analyses—to serve as an indication of "present or future public convenience and necessity" conflicts with FERC's Natural Gas Act-mandated duty to "'protect consumers against exploitation at the hands of natural gas companies'" [31 quoted in 29] [see also 26 and 32]. It is also not unusual for pipeline developers to be affiliates of natural gas producers [26]; thus, it is the supply of natural gas—as well as the profitability of pipeline-building—that are often dictating the construction of new pipelines, not consumer demand.

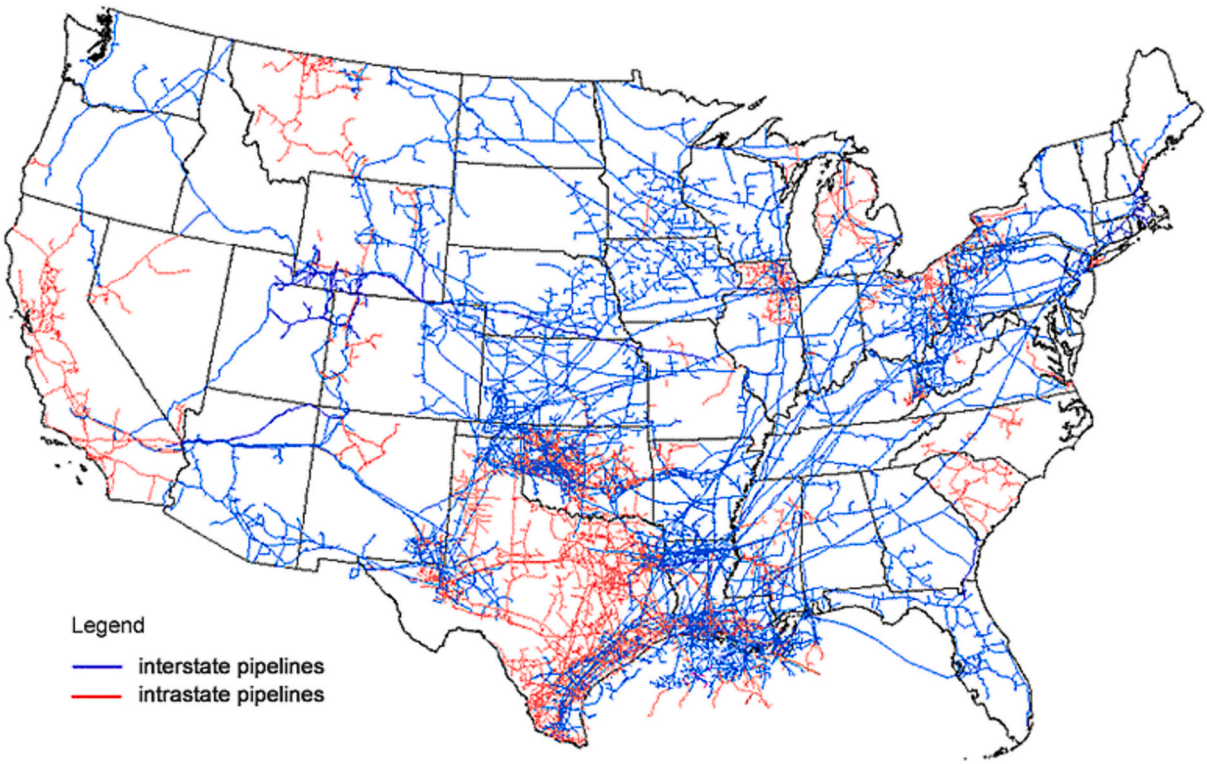

Fig. 1. Map of U.S. Interstate and Intrastate Natural Gas Pipelines. [24].

In 2021 the Court of Appeals for the District of Columbia (D.C. Circuit) ruled in *Environmental Defense Fund v. FERC* that precedent agreements are insufficient "to show that construction of a proposed new pipeline 'is or will be required by the present or future public convenience and necessity'" [28]. Although this ruling may be interpreted as a step in the right direction, as Keefe argues, the court left "a gap in what criteria FERC should use when evaluating pipeline applications" [29,p. 71]. How this ruling will affect FERC's decision-making moving forward is unclear, particularly in light of the views of some FERC Commissioners, such as Commissioner Mark Christie, who has stated on the record his belief that one of FERC's primary charges is "to *promote* the development of the nation's natural gas resources" [33, pp. 7–8, emphasis in original, quoted in 32].

In addition to the captive utility customers who may face increased rates because of the pipeline buildout, there are many other people who shoulder the costs of pipeline construction. Once a pipeline project is deemed to be in the public interest, FERC grants the pipeline developer a "Certificate of Convenience and Necessity," which provides that company the authority to use eminent domain to acquire property from landowners who are unwilling to negotiate a pipeline easement agreement [34]. The use of this authority is not a rare occurrence; for instance, in 2017 Mountain Valley Pipeline, LLC sued approximately 300 landowners to initiate condemnation proceedings after these landowners refused to negotiate easement agreements with the pipeline company [35]. Numerous environmental and landowner rights groups have argued that FERC has unjustly granted pipeline companies the right to use "eminent domain for private gain," rather than reserving this power for projects that truly serve public needs [26].

In addition to the loss of land, residents of pipeline-affected communities also contend with other issues, such as the drying of wells and natural springs on which they or their farm may depend, water pollution, biodiversity destruction, the removal of beloved trees and other natural features, loss of privacy during the pipeline construction phase, and a fear of leaks and explosions once the pipeline is in operation. It is well-documented that chronic stressors such as these can trigger mental health issues and stress-activated health problems [6,36–38], and there is a growing literature documenting the mental health toll that ecological degradation, climate change, and industrial development can have on affected populations [5,39–41]. In the section that follows, we discuss what is known from these studies and elucidate the gaps in understanding that remain.

2.4. Mental health impacts of industrial activity and ecological loss

Previous research has demonstrated that the presence of industrial activity is associated with increased stress, depression, and feelings of powerlessness among nearby populations [5–7]. For instance, in their study of the effects that residential proximity to industrial sites have on mental health, Downey and Van Willigen found that measures of industrial activity "[had] a greater impact on depression than did most of the individual-level variables traditionally included in mental health research" [5,p. 301]. They argue that the mechanism by which this effect occurs is related to the stress that close proximity to industrial activity causes to individuals, wherein they feel powerless to protect themselves from potential health threats and the neighborhood disorder they perceive being linked to these industrial sites.

Evidence also suggests that is not just the magnitude of the industrial activity that matters; institutional processes also play a significant role in the mental health effects of industrial activity on local populations. For instance, sociologist Stephanie Malin found that two primary factors related to the institutional context of unconventional oil and gas production in Colorado—uncertainty and powerlessness—were the primary drivers of negative mental health outcomes in nearby populations. Specifically, Malin found that the public's lack of access to information regarding potential health risks of oil and gas production, in combination with the public's limited ability to substantively participate in decision-making about whether and how oil and gas production occurs, resulted in high levels of chronic stress and self-reported longer-term depression among the affected public [6]. Similarly, geographer Anna Willow maintains that the interaction of institutional disempowerment

and uncertainty among populations living with industry-caused environmental degradation can lead to "psychological trauma" in local populations. Furthermore, she argues that this trauma "can be even more detrimental [to residents' well-being] than the physical hazards under scrutiny" [42].

A growing body of literature has recognized the effects that environmental degradation and climate-related disasters—or worry about future disasters—can have on mental health [39,40,43]. Philosopher Glenn Albrecht coined the term "solastalgia" to describe the psychological pain a person can feel when the natural environment around them is degraded due to industrial development, natural or technological disasters, or war. As Albrecht explains, solastalgia is a type of psychological distress resulting from environmental change, "a form of homesickness one gets when one is still at 'home'" [39,p. 48]. A related concept, ecological grief, can be understood as "the grief felt in relation to experienced or anticipated ecological losses, including the loss of species, ecosystems, and meaningful landscapes due to acute or chronic environmental change" [40,p. 275]. "Eco-anxiety" and "climate anxiety" have also increasingly been used in both the academic literature and mainstream media to describe the psychological responses individuals experience to perceived future threats, especially those related to climate change [41].

Despite growing interest in the ways that environmental change and mental health are related, as Malin notes, few studies have examined the ways that chronic environmental stress interacts with institutional processes to produce negative mental health outcomes [6]. Moreover, no studies to our knowledge examine the effects of new natural gas pipelines—or the institutional processes dictating their approval and construction—on the mental health of local residents. In response to these gaps in understanding we ask: How have institutional decision-making processes affected the mental health of residents living in the path of recently approved interstate natural gas pipelines? In the section that follows, we outline the three sources of data we use to answer this question.

3. Methods

3.1. Survey 1: Mail survey with residents in 10 counties

In fall 2019, our research team mailed a survey questionnaire (the "Quality of Life in Rural Virginia/West Virginia Survey") to residents living in 10 of the counties through which the Mountain Valley Pipeline was being built. Although pipeline construction had only begun one year prior—in 2018—residents in our sample had known about the pipeline since the fall of 2014, when letters from FERC announcing the construction of the MVP were sent to landowners whose property would need to be acquired by the pipeline company—either through a negotiated easement agreement or through eminent domain proceedings—in order for the pipeline to be built. Once completed, the MVP was planned to stretch 303 miles through parts of West Virginia and southwest Virginia, adding to the list of other established or planned pipelines transporting natural gas from the Marcellus Shale Region to markets in the Southeastern U.S. Other local residents outside of the construction route but still living in the 1115 ft Potential-Impact Radius (also known as the "blast zone," which is the more commonly used term) were informed of the proposed project through less official means, via word of mouth or the media.

To draw our sample, a Geographic Information System database was created using county tax assessment data. This database included all of the land parcel addresses within the six counties in the Virginia MVP corridor and four of the counties in the West Virginia MVP corridor. We retrieved all of the addresses falling within the 1115-ft-wide Potential-Impact Radius (blast zone) of these 10 counties, and we also drew a random sample of addresses that were at least 10 miles away from the pipeline in those same counties to serve as our control group. Corporate landholders, federal and state-owned property, and properties owned by the pipeline developer were eliminated, and multiple parcels owned by one landowner were consolidated. When there was a difference in the physical address and the landowner address for a given parcel (indicating that the parcel was not owner-occupied), we sent a survey to both addresses to ensure renters also had an opportunity to participate. However, residents were instructed to only fill out one survey per household. After accounting for surveys that were returned as undeliverable, our sample included 2654 addresses in Virginia and West Virginia.

The Quality of Life in Rural Virginia/West Virginia survey included 92 questions and was nine pages long. Before distributing the survey, it was pretested with a group of community members outside the study sample. The survey opened with a variety of questions about residents' feelings of place attachment to the county where they live, the activities they do on their land, their quality of life, and family ties to the area. The survey then moved into a series of questions about the MVP, including residents' feelings about the pipeline, their participation in regulatory agencies' public input opportunities regarding the pipeline, their involvement in activities oriented toward resisting the pipeline, and their attitudes toward government agencies. The survey also included a variety of questions to measure mental health, including the Kessler Psychological Distress Scale [44] and the Sense of Control Scale [45]. Also included in the survey were demographic questions, a question about whether the respondent owned or rented the property, and opportunities to provide qualitative comments through open-ended questions.

Given the polarizing nature of energy infrastructure projects in the United States and the prevalence of the "jobs versus environment" conflict that often arises in rural communities [e.g. see 46], we sought to incorporate a number of survey design techniques to ensure people from a variety of perspectives would complete our questionnaire. In other words, we sought to reduce nonresponse bias (also called nonresponse error), which "occurs when the characteristics of respondents differ from those who chose not to respond in a way that is relevant to the study results" [47,p. 5]. First, as noted above, we gave the survey a neutral title: the "Quality of Life in Rural Virginia/West Virginia Survey." Secondly, the first 23 questions of the survey did not mention the Mountain Valley Pipeline at all and were focused on quality-of-life, place attachment, and land use. Only 10 of the 92 questions in the survey specifically mentioned the MVP. Finally, we also offered an incentive for completed surveys in the form of a drawing for eight different $100 gift cards. Despite our efforts to minimize nonresponse bias, it is possible that more people who are concerned about the MVP responded to our survey. However, it is worth noting (as described below) that we did receive a healthy number of responses from our control group, which was composed of individuals who would have been less affected by the pipeline, by virtue of the fact that they all lived at least 10 miles away from the pipeline route.

Following Dillman et al.'s Tailored Design Method for increasing mail survey response rates [47], we first mailed a letter outlining the study, which was then followed by the paper survey questionnaire one week later. Four weeks after mailing the survey, we sent a reminder postcard to non-responders. Five weeks after sending the postcard, we sent a replacement survey to non-responders.

In all, we received 783 responses to our mail survey, which is a 29.5 % response rate. Of these responses, 433 were from people in the blast zone (Potential-Impact Radius) of the MVP, and 350 were from people in our control group (living at least 10 miles from the pipeline in the same counties). Surveys were entered into an Excel database by a team of research assistants, and each survey entry was checked for accuracy by one of the authors.

3.2. Survey 2: Online survey with pipeline-affected residents

In February 2021, the Federal Energy Regulatory Commission (FERC) announced that it would be creating an Office of Public

Participation (OPP) to "coordinate assistance to the public with respect to authorities exercised by the Commission" [48]. This office had been authorized by Congress in 1978 under the Public Utility Regulatory Policies Act but never created. In legislation passed by Congress in December 2020, FERC was directed to initiate the establishment of the OPP and provide an update to both Houses of Congress by June 25, 2021 [49]. In March 2021, FERC announced that it would "solicit public input on how the Commission should establish and operate the Office of Public Participation" via listening sessions and written comments [50].

Soon after FERC announced it would be inviting public input to inform the creation of the OPP, pipeline-affected resident and retired environmental regulator William Limpert contacted the first author and attorneys Megan Gibson and Tiferet Unterman with the Niskanen Center (a non-profit organization based in Washington, D.C. that supports people affected by pipelines) seeking assistance in developing a survey to gather information about pipeline-affected residents' experiences with FERC. He hoped that the information gleaned from this survey could be submitted as a public comment to help inform the creation of the Office of Public Participation.

Seeing Mr. Limpert's request both as an important opportunity to help inform the creation of the Office of Public Participation and as an opportunity to develop questions that could reveal some of the reasons for the research team's findings from the 2019 survey, the first author volunteered to lead the development of the survey questionnaire. Over the course of several weeks, the first author, Limpert, Gibson, and Unterman developed a 109-question survey, which was housed on the online survey platform Qualtrics. The survey was pretested and then distributed to the Niskanen Center's contacts with pipeline-affected landowners throughout the United States and also sent through the listservs of a variety of community advocacy groups.

We received 244 responses to this survey, with 40 % of our respondents having been affected by the Atlantic Coast Pipeline in Virginia; 37 % affected by the Mountain Valley Pipeline in Virginia or West Virginia; 12 % affected by the Jordon Cove/Pacific Connector Pipeline in Oregon; 4 % affected by the Penn East Pipeline in Pennsylvania; and 8 % affected by a different pipeline. The first author compiled the results and submitted a public comment reporting the survey findings on April 21, 2021 under FERC Docket # AD21–9-000. The multiple-choice and open-ended questions were then analyzed and coded thematically for the present study.

3.3. Semi-structured interviews with affected landowners

To augment these two surveys, between 2019 and 2022, members of our team conducted 13 semi-structured interviews with landowners whose property is on or near the Mountain Valley Pipeline route in Virginia or West Virginia and who had formally submitted comments about the pipeline project during public commenting periods. Interviewees were recruited both through a recruitment postcard included with the mail survey and via snowball sampling.

4. Results

4.1. Negative mental health effects

There were three questions in the September 2019 mail survey that directly related to state and federal agencies' public participation opportunities. The first question asked whether respondents had submitted a written comment expressing concerns about the pipeline during FERC's draft Environmental Impact Statement (EIS) public comment period; the second question asked whether they had ever given oral testimony at a FERC public scoping meeting; and the third asked whether they had given testimony at a hearing of the Department of Environmental Quality (in Virginia) or Department of Environmental Protection (in West Virginia).

The first relationship we analyzed was comparing levels of psychological distress, (as measured through the Kessler 6 Screening Scale for Psychological Distress [44]—the K6[1]) for four different groups of respondents: those who had not participated in any of the above public participation opportunities, those who had participated in one of the public participation opportunities, those who had participated in two of the public participation opportunities, and those who had participated in three of the public participation opportunities.

Table 1
OLS Regression of Psychological Distress[1] on Engagement with Regulatory Agencies' Public Participation Opportunities[2] (Survey 1: Quality of Life in Rural Virginia/West Virginia Mail Survey).

	Model I		Model II	
Predictor Variable	*B*	SE	*B*	SE
Participation:				
One type	0.244	0.485	−0.050	0.523
Two types	1.571*	0.769	1.638*	0.810
Three types	2.081***	0.649	2.467***	0.708
Control Variables[3]				
Income			−0.240***	0.066
Education			0.005	0.089
Pipeline on property			−0.230	0.333
Constant	2.956***	0.129	3.003***	0.135
R^2	0.019**		0.043***	

[1] Kessler 6 Index.
[2] The comparison category is no participation.
[3] Control variables are centered at their means.
* p. ≤ 0.05.
** p. ≤ 0.01.
*** p. ≤0.001.

As Table 1 and Fig. 2 show, our analysis indicates that psychological distress was significantly higher for respondents who engaged in multiple forms of public participation than it was for those who did not engage with these opportunities at all. Moreover, psychological distress was highest for those who were the most engaged with public participation opportunities. The difference in levels of psychological distress among those who took part in two types of public participation and those who did not engage in public participation processes at all is statistically significant at the .05 level, and the difference in levels of psychological distress between those who took part in three types of public participation and those who did not engage in these processes at all is statistically significant at the .001 level. In Model 2 we controlled for age, income, and whether the pipeline was being built through a person's land. The size of the coefficients and the patterns of significance did not change with these controls.

Importantly, these results indicate that the negative mental health effects cannot solely be attributed to traumas associated with having a pipeline built through one's property; rather, it is the degree of engagement a person has had with regulatory agencies that is associated with poor mental health. Why do people who are more highly engaged with regulatory agencies' public participation opportunities experience distress from this engagement?

4.1.1. How performative public participation can lead to psychological distress and stress-activated health conditions

As noted above in the methods section, we included a series of questions in our second survey (the online survey about pipeline-affected residents' experiences with FERC) to understand potential

[1] The K6 asks respondents how frequently they have felt the following in the past 30 days: (1) Nervous; (2) Hopeless; (3) Restless or fidgety; (4) So depressed that nothing could cheer you up; (5) That everything was an effort; and (6) Worthless. Choices include (a) None of the time; (b) A little of the time; (c) Some of the time; (d) Most of the time; or (4) All of the time. Scores in the index range from 0 (no symptoms of distress) to 24 (all symptoms of distress, all of the time) [44].

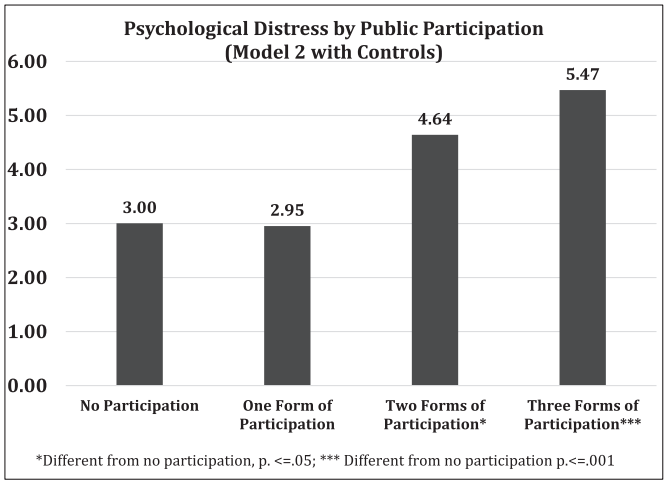

Fig. 2. Psychological Distress by Engagement with Federal and State Agencies' Public Participation Opportunities, Controlling for Age, Income, and Whether Pipeline is Sited through Property (Survey 1: Quality of Life in Rural Virginia/West Virginia Mail Survey).

reasons for the negative mental health outcomes we found associated with engagement in regulatory agencies' public participation opportunities in our first survey. As the results reported below indicate, one important contributing factor may be residents' perception that their concerns were ignored and dismissed by agency staff.

As shown in Fig. 3, of the 135 survey respondents who had attended a FERC scoping meeting, almost 72 % stated that they "felt FERC staff were dismissive" of their concerns.

Another question in the online survey asked whether respondents felt the concerns they shared during the scoping meeting had made a difference in FERC's decision-making on the project. As shown in Fig. 4, of the 135 respondents who attended a scoping meeting, almost 93 % said that they did *not* feel that their concerns made a difference.

These sentiments also extended to the written commenting periods. As shown in Fig. 5, of the 174 survey respondents who reported that they had submitted a written comment to FERC during an official commenting period, more than 98 % said that they did not feel FERC had adequately addressed the concerns they raised in their comments.

In the open-ended responses we received to both the online survey and the mail survey, respondents provided additional insights into the mechanisms by which public participation opportunities have contributed to negative mental health outcomes for affected residents. As the respondent quoted below relates, dedicating large amounts of time and energy to public participation processes over multiple years—while living with continued uncertainty about the outcome of the project—is tremendously stressful:

> For six years I was daily consumed with interventions and actions related to stopping the Atlantic Coast Pipeline. This caused stress for me and for my family. We did not know what our future would be like, and it put everything in our lives on hold. I also had to give up time at my regular employment so that I could continue to take a leadership role in [a local group working to advocate for pipeline-affected residents]. This created a financial burden for my family and caused further stress.

As this respondent explained, multiple intersecting stressors emanated from their engagement, including time, financial burdens, and uncertainty about the future.

Another respondent stated that over the previous three years they had spent "countless hours writing letters, going to meetings, speaking out against the pipeline, conversing with [pipeline] agents to have questions answered…[the] emotional turmoil was nonstop." In another response, an individual described the ongoing effect that the pipeline certification and permitting process has had on his wife, stating,

> My wife has worked with others since 2014 to fight this unnecessary and environmentally destructive pipeline project. She works some nights until 0400 and is constantly sleep deprived, not to mention the angst and continuous release of endogenous cortisol due to the constant stress. At 69 [years old], this is something her body does not need, and it is taking its toll.

This respondent's quote points to sleep deprivation, angst, and the release of stress hormones as consequences of his wife's engagement. Other respondents discussed being prescribed antidepressants and anti-anxiety medications—some for the first time in their lives.

One individual shared how the pipeline battle had deepened pre-existing depressive conditions among members of their family, to the point of triggering suicidal thoughts:

> Several of my family members deal with long term depression and anxiety and were unable to mentally cope with the stress and

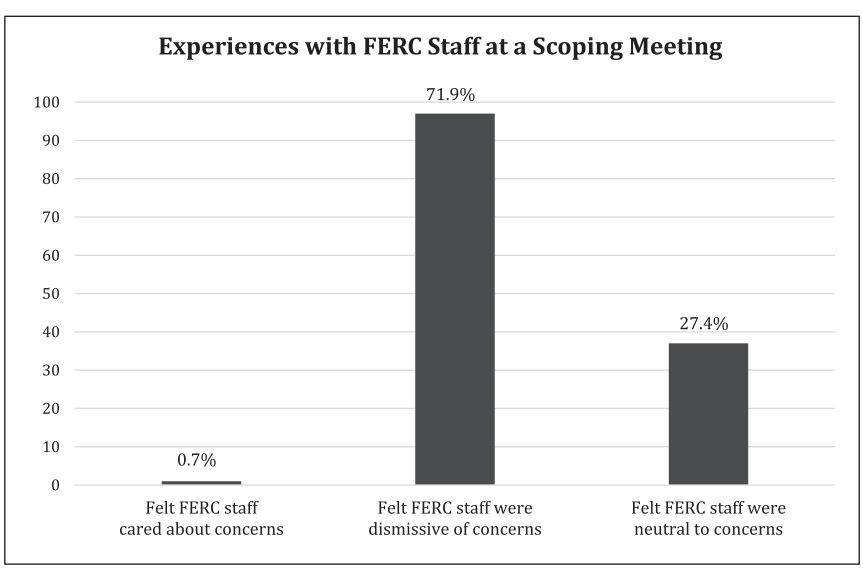

Fig. 3. Distribution of responses to the question, "Which statement best describes your experience with FERC staff at the scoping meeting?" $n = 135$. (Survey 2: Online Survey).

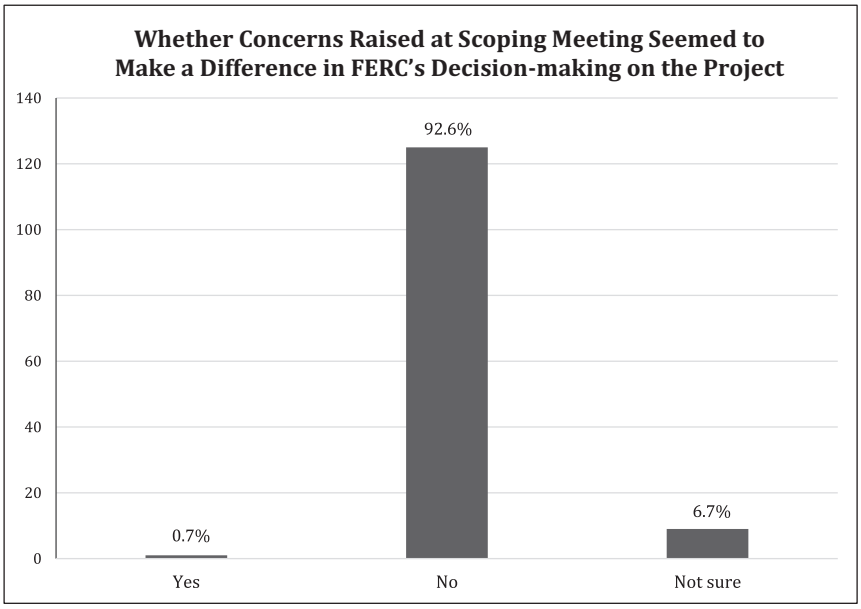

Fig. 4. Distribution of responses to the question, "Do you feel that the concerns you shared during the scoping meeting made a difference in FERC's decision-making on the project?" n = 135. (Survey 2: Online Survey).

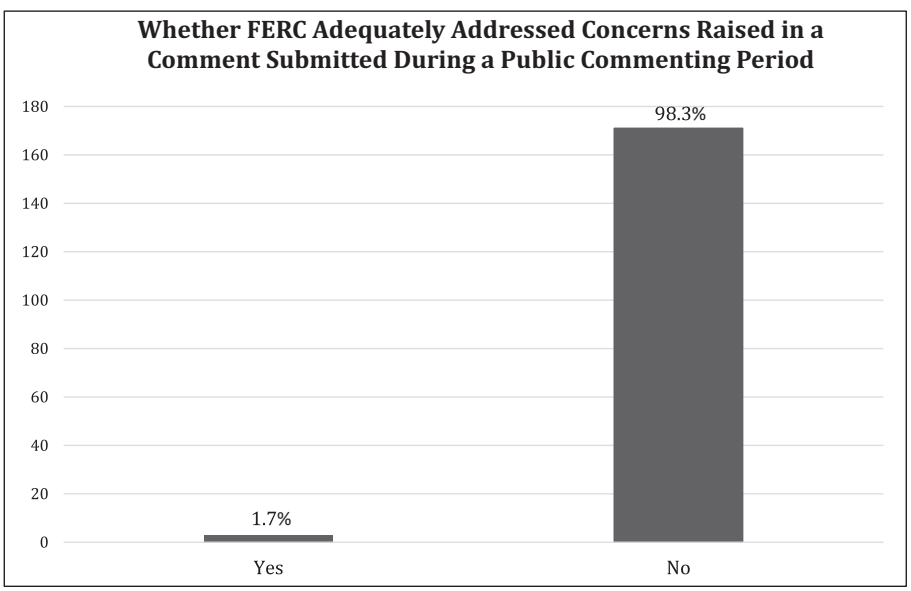

Fig. 5. Distribution of responses to the question, "Do you feel that FERC adequately addressed your concerns [raised in an official commenting period]?" $n = 174$. (Survey 2: Online Survey).

> negative impacts of the pipeline…[They] have had increased thoughts of suicide as a result of the stress from the legal battles.

As the above quote reveals, fighting a pipeline can be so deeply upsetting and stressful that some people may contemplate taking their own lives. This sentiment was not an isolated one among our survey respondents, unfortunately; another person similarly discussed their own suicidal feelings, triggered by the experience of extreme disempowerment:

> The ongoing process and disempowerment fueled depression and anxiety. Ongoing engagement with the pipeline struggle [led] to a diagnosis of CPTSD [Complex Post-Traumatic Stress Disorder]… Eventually I decided I had to move away from the home and town where I grew up because of the constant increased anxiety and triggers from pipeline construction making daily life, wellness, holding a job and [being] capable of living a full life impossible, and ongoing feelings of suicidality triggered by the project. Had I not moved away I may no longer be living.

The above quote poignantly reveals the seriousness of the mental health impacts some of our survey respondents experienced directly related to their engagement with pipeline struggles. These results echo earlier research that points to institutional disempowerment and uncertainty as being primary drivers of negative mental health effects associated with proximity to industrial development [5–7].

Many respondents expressed that their powerlessness to influence government decision-making—despite the countless hours they had spent trying—not only led to increased feelings of stress, anxiety, and depression, but also had consequences for their physical health. One person from Virginia who lives close to the Mountain Valley Pipeline

route expressed alarm that "Since 2014, I have known at least 5 people who have passed away in part due to stress or associated with activities related to fighting this MVP pipeline project. All were landowners that the right-of-way crossed their land." In the open-ended survey responses and in interviews we conducted with pipeline-affected residents, many specifically discussed developing a variety of stress-induced health conditions—such as insomnia, high blood pressure, heart problems, teeth grinding, headaches, tremors, and Atrial fibrillation—during the pipeline certification and construction processes.

The link between mental health and physical symptoms is well documented in the literature [37,38], and respondents recognized this connection clearly. As one respondent noted, "Mental and physical health are tied together. My husband has severe COPD and has been on O2 [oxygen] for the duration of this situation." Another stated, "The stress has taken a serious toll on our physical health ranging from blood pressure issues to immune system compromises." Another pipeline-affected resident described how the stress of the Atlantic Coast Pipeline project had manifested in their immune system:

> I experienced shingles four times over the course of 6 years and bronchial pneumonia twice. Shingles works on weakened nerves and pneumonia comes along when the body is weakened by stress, fatigue etc. I experienced these things frequently over the course of six years and am certain they contributed a lot towards my poor health. And now that the [Atlantic Coast Pipeline] has been canceled, I still experience outbreaks of herpes zoster virus (shingles-related) as it took such a strong hold in my system during those years.

One respondent stated that they became prediabetic during the process of fighting the pipeline, and that their "cholesterol spiked as a result of the daily stress." Another resident reported, "I have experienced so much anger to the point of chest pain. Just writing about it produces the same experience." A different person recalled that "the stress caused heart issues from anxiety resulting in many hospital visits and medication. I was afraid to go anywhere alone for fear of having a spell with my heart."

One survey respondent shared, "For a while I saw rainbow auras around things. Stress-related, the doctor said." Another noted that he had a stroke in September 2018 "after arguing with pipeline people," while another respondent asserted, "The stress of the private company stealing my family land was a factor in a brain hemorrhage I had the day after I attended a FERC monthly meeting."

And one pipeline-affected resident—a retired engineering professor who wrote and submitted over 800 pages of reports to FERC and other agencies detailing the scientific problems with the Mountain Valley Pipeline project—stated in his interview that the stress that resulted from having his expertise ignored by government agencies was a major contributor to his developing congestive heart failure, which is a stress-activated condition. His physician advised him against testifying in court for his eminent domain case, because the stress of doing so could further aggravate his heart condition—and possibly kill him.

It is important to note that in both surveys, the open-ended comments about residents' experiences with, or sentiments about, pipeline companies and/or regulatory agencies were overwhelmingly negative. In the mail survey, only 12 % of comments about MVP made by people living in the blast zone or construction zone were positive (mostly relating to the money received from an easement payment or a general belief that the pipeline would provide jobs and/or more financial prosperity in the region). In the online survey, only two comments were explicitly positive about natural gas pipelines. One respondent stated that they had found a job working for the pipeline. The other said they were able to use the land cleared by the pipeline for recreational purposes and that they were able to buy an adjoining property because the pipeline right-of-way had decreased the access to that parcel, reducing the value of the land. This person declared, however, that despite these positives, "the process of dealing with the energy companies and FERC was beyond terrible."

Table 2
OLS Regression of Perceptions of Government Responsiveness[1] on Engagement with Regulatory Agencies' Public Participation Opportunities[2] (Survey 1: Quality of Life in Rural Virginia/West Virginia Mail Survey).

	Model I		Model II	
Predictor Variable	*B*	SE	*B*	SE
Participation:				
One type	−0.612***	0.108	−0.593***	0.119
Two types	−0.955***	0.175	−0.885***	0.185
Three types	−0.944***	0.142	−0.884***	0.156
Control Variables[3]				
Income			0.009	0.015
Education			−0.032	0.020
Pipeline on property			−0.089	0.075
Constant	2.323***	0.029	2.332***	0.031
R^2	0.113***		0.120***	

[1] Degree of agreement with the statement "Overall I believe that most government agencies are responsive to people's concerns about industry activity." 4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree.
[2] The comparison category is no participation.
[3] Control variables are centered at their means.
*** p. ≤ 0.001.

4.2. Loss of trust in government institutions

Another important finding from our analyses of both the mail survey and the online survey is that engaging with regulatory agencies' public participation opportunities has led many pipeline-affected residents to lose trust in government institutions.

Our analysis of the mail survey distributed in September 2019 indicates that people who took part in regulatory agencies' public participation opportunities were far more likely to disagree or strongly disagree with the statement, "Overall, I believe that most government agencies are responsive to people's concerns about industry activities." As is shown in Table 2 and Fig. 6:, the difference in levels of agreement with this statement between those who took part in one, two, or three types of public participation and those who did not participate in any opportunities is statistically significant at the .001 level (Fig. 6).

The qualitative comments from the surveys and interviews we conducted with affected landowners corroborate these findings and indicate that engagement with regulatory agencies has caused many to lose faith in government institutions. As one interviewee noted,

> …It's like being robbed…It is like if there was a stranger that comes into your house and takes something from you, and you ask them to leave. And they said, "I'm sorry but your government said I could come into your house anytime I wanted and take whatever I want. By the way, I am leaving a bomb on your kitchen table, and you can't move that bomb. And if you try to find me, I will be gone because I can change my name—LLC, yup."

This interview participant further articulated, "If someone with a lot of money wants what you have, they will take it from you, and your government will *not* help you. That's what I have learned in this whole thing. That is the big lesson."

Many of our research participants discussed losing confidence in the government, such as one who wrote, "I don't trust our government any longer…[I feel] righteous indignation that my US Constitutional rights are being violated every day!" Another articulated that through this process they had come to view government agencies as "crooked." Unpacking the reasons behind these sentiments, one respondent explained,

> I have lost faith in both our federal and state government as serving the people. How is it possible that an American can play by the rules and work their whole life to realize a dream, only to have a private for-profit corporation, with the backing of a federal agency, take

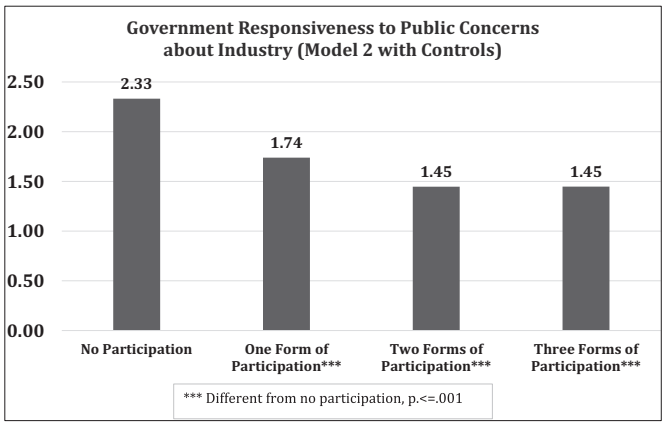

Fig. 6. Perceptions of Government Responsiveness to Concerns about Industry by Engagement with Regulatory Agencies' Public Participation Opportunities, Controlling for Age, Income, and Whether Pipeline is Sited through Property (Survey 1: Quality of Life in Rural Virginia/West Virginia Mail Survey).

> your property against your will!? While I hate the Mountain Valley Pipeline, I hate FERC even more for granting the awesome power of eminent domain, using a spurious definition of the term, to a private company!

It is important to underscore here that in all of these quotes, respondents discussed *losing* faith in government institutions, implying that before their experiences with the pipeline permitting process, they had some level of trust in government agencies. It was through the process of engaging with these agencies' public input opportunities that their trust was destroyed.

Many people described feeling that government agencies' public participation processes are just an act. As one asserted, "The engagement processes are nothing but a sham." Another respondent further expounded, "FERC is like a Black Hole where we input comments and information and never receive a response." And yet another cited the "dishonesty of the EIS [Environmental Impact Statement] process, in which tomes of data are collected and put forth—but the approval of the project is never in doubt." The futility of respondents' efforts to affect decision-making through public participation opportunities has led many to reach the same conclusion: FERC and other regulatory agencies are captured by industry. As one respondent stated, "We spent the first three years asking FERC to do its job of protecting the public before discovering that [protecting the public] was never FERC's job—[its job] was solely to facilitate the development of pipelines!"

Again and again, respondents articulated that they felt "powerless" or "helpless" in the pipeline permitting process and described "losing faith" in what they had understood to be one of government's roles: protecting the rights of the people. As one affected landowner expressed,

> It's hard to describe the despair you feel after working your whole life to own land and a home and provide for your family when the government sanctions and makes legal a condemnation and forced seizure of your property. In this circumstance you have no rights and are paid pennies on the dollar to steal your property for corporate profits.

For some people, their disillusionment moved beyond government agencies to questioning the entire political-economic system itself. As one mail survey respondent articulated,

> After attending all of the meetings I could, the hours I researched natural gas and how the gas would be used, to the impact in other communities, to providing testimony in front of DEQ, MVP, Local Officials, FERC, and anyone who asked for community input, my final assessment is that we do not live in a democracy. The MVP project has been so funded that it was a foregone conclusion that public comment was only a formality…. Capitalism has created an America where money takes the hopes and dreams of hard-working people and lies, cheats, and steals to make a profit for those at the top.

5. Discussion and conclusion

The passage of NEPA in 1969 seemed to hold great promise both for protecting the environment and for democratizing decision-making through instituting public participation requirements for government actions expected to have environmental impacts. Although "elaborate procedures were adopted to gather information" from the public, no standardized mechanisms were established to incorporate this public feedback into final decisions [17,p. 133]. This has resulted in NEPA's public participation requirements being treated solely as "a 'procedural' statute" without institutional expectations or accountability for any "substantive outcome" for the public input that is gathered [11,p. 484]. As numerous scholars have argued, this has meant that the degree of influence that public feedback can have varies widely across agencies [10], and members of the public may spend tremendous amounts of time and energy engaging in processes that—as one of our respondents put it—are akin to dropping comments into a black hole.

Our findings demonstrate that when people engage in public participation processes that have little or no effect on agency decision-making, it can cause significant harm to the mental and physical health of those individuals. Moreover, performative participation can also damage people's faith in the role of government institutions to protect the well-being of local residents. Inviting the public's "input" on proposed pipeline projects—without providing a mechanism for that input to actually influence whether or not a project moves forward—risks the credibility of not only the agencies inviting public input but government institutions more broadly. As researchers at Cornell Law School's E-Rulemaking Initiative assert, "A democratic government should not actively facilitate public participation that it does not value;" encouraging people to engage in "participatory acts of low value to government decisionmakers…is peddling democratic snakeoil" [51].

Fixing broken public participation processes will require that the federal government establish consistent and transparent mechanisms for public input to exert influence on final decisions across agencies. Treating the public participation mandate as purely procedural, rather than substantive, has led to inconsistencies in how public participation opportunities have been implemented and the degree of influence that public comments can have on final agency decisions.

As scholars have noted, however, maintaining ambiguity in whether or how public comments will influence decisions serves to uphold power structures and may be deliberate. This vagueness is conspicuous in the response provided to the question, "Do my comments make a difference?" in the Frequently Asked Questions section of the Regulations.gov website:

> Yes. Public participation matters. Democratic, legal, and management principles justify why public comments make a difference in regulatory policy. Public participation is an essential function of good governance. Participation enhances the quality of law and its realization through regulations (e.g. Rules) [52].

This answer deflects the focus away from *how* the public comments that are amassed do (or do not) influence decisions and instead focuses on the action of participation in itself. "Democratic, legal, and management principles" on their own cannot "justify why public comments make a difference in regulatory policy"; these principles simply justify how public comments *can* make a difference in regulatory policy *if* there is a mechanism for those comments to be incorporated into terminal decisions. In truth, a forthright answer to this question cannot be given because there is such wide variability across agencies in how public comments are used in policy and planning [10]. It can also be argued

that this ambiguity helps to create "the illusion of substantive impact" [17,p. 123] while still preserving the existing configuration of power. Through providing a venue for people to voice their concerns and opinions, these agencies create a release valve, potentially channeling people's energy away from other actions that could have a greater influence on outcomes [10,21].

As Malin et al. maintain, the oil and gas industry holds meta-power over the permitting process for oil and gas development [20]. We contend that the same argument can be made with regard to pipelines, as evidenced through FERC's granting of 1021 Certificates of Convenience and Necessity for interstate pipelines and rejecting only 6 within a 20-year span (an approval rate of more than 99 %) [4]. Those with meta-power enjoy the ability to set the bounds within which other actors, such as the public, can exert influence. This often occurs by structuring the overarching frameworks that govern the system, or, as Malin et al. put it, "creat[ing] and control[ing] the rules of the game" [20,p. 1813]. Indeed, the oil and gas industry's meta-power was on full display with the passage of the Fiscal Responsibility Act during the summer of 2023, which—in addition to raising the debt ceiling—fast-tracked the Mountain Valley Pipeline by mandating that all outstanding permits be approved within 21 days of the bill's passage and exempting the pipeline from further judicial review [53].

As noted previously, there is a tendency among policymakers to equate environmental justice with distributive justice, which can be understood in the energy development realm as ensuring equity in the allocation of burdens and benefits of energy infrastructure or policies [13]. However, distributive justice is just one component of environmental justice. Equally important are *recognition justice* (valuing the perspectives of institutionally subordinated and historically marginalized groups); *procedural justice* (providing all affected parties equitable access and opportunities to influence decision-making), and *reparative justice* (acknowledging past harms against marginalized groups and working to repair those harms) [13,14].

Importantly, procedural, reparative, and distributive justice are unattainable without a commitment to recognition justice, for, as Nancy Fraser argues, when "patterns of disrespect and disesteem are institutionalized, they impede parity of participation, just as surely as do distributive inequities" [15,p. 27]. In other words, through restricting the influence that public comments can have on decision-making about the siting of interstate natural gas pipelines—i.e. by not providing a mechanism for the public to *refuse* a pipeline—it is impossible for FERC to adhere to the tenets of environmental justice. To achieve environmental justice, the perspectives of residents living in pipeline-affected communities must be recognized and authentically incorporated throughout decision-making processes. As our findings reveal, the violation of recognition and distributive justice through inviting performative acts of public participation brings measurable injury to the mental health of participating residents and damages their faith in the legitimacy of government agencies. Arguably, this is antithetical to what should occur in a democratic society in which institutions are presumably designed to protect and meet basic human needs, not to facilitate the accumulation of wealth among an elite few.

Credit authorship contribution statement

Shannon Elizabeth Bell: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Michael Hughes:** Conceptualization, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing, Funding acquisition. **Grace Tuttle:** Writing – original draft, Writing – review & editing. **Russell Chisholm:** Conceptualization, Resources, Writing – review & editing. **Stephen Gerus:** Conceptualization, Data curation, Formal analysis, Investigation, Writing – review & editing. **Danielle Mullins:** Data curation, Investigation, Project administration, Supervision, Validation. **Cameron Baller:** Data curation, Investigation, Writing – review & editing. **Kelly Scarff:** Data curation, Validation, Writing – review & editing. **Rachel Spector:** Data curation, Validation. **Denali Sai Nalamalapu:** Writing – original draft, Writing – review & editing.

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.

Data availability

Data will be made available on request.

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