

## ORIGINAL ARTICLE

# Aligning Behavioral Assumptions Underlying Policy Instruments: A Principle for Designing Policy Mixes Targeting Behavioral Change

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**关键词:** 行为假设 | 政策组合 | 政策工具 | 行为公共管理 | 公众接受度

## ABSTRACT

In practice, multiple policy instruments are often combined to achieve complex goals. However, predicting whether policy mixes will have complementary or conflicting effects remains a theoretical challenge, especially in those aimed at changing individuals' cognition and behavior. We provide novel theoretical and empirical insights into policy mix effectiveness by defining and differentiating the behavioral assumptions embedded in policy instruments, arguing that outcomes depend not only on the assumptions within each instrument but also on the consistency of assumptions across instruments. We conducted a survey experiment in a Chinese city preparing to build a nuclear power plant (NPP;  $n = 417$ ). After testing participants' acceptance of NPP construction across different policy mix scenarios (combining egoistic and altruistic instruments), we found that mixes grounded in consistent behavioral assumptions more effectively increased public acceptance. Thus, consistent behavioral assumptions across policy instruments should be a core principle when designing policy mixes targeting behavioral change.

## 摘要

在实践中，多个政策工具往往被结合使用以实现复杂的目标。然而，预测政策组合是否会产生互补或冲突的效果，尤其是在那些旨在改变个体认知和行为的政策中，仍然是一个理论难题。我们通过定义和区分嵌入各类政策工具中的行为假设，提供了关于政策组合有效性的创新性理论和实证见解，认为政策结果不仅取决于每个政策工具内的行为假设，还受到不同政策工具之间行为假设一致性的影响。我们在一个计划建设核电站的中国城市进行了一项调查实验( $n = 417$ )。通过测试参与者在不同政策组合情境下对核电站建设的接受度，我们发现，基于一致行为假设的政策组合更有效地提升了公众的接受度。因此，在设计旨在改变行为的政策组合时，确保政策工具之间的行为假设一致性应当成为设计的核心原则。

## 1 | Introduction

While policy mixes hold great promise for addressing today's multifaceted challenges, their success depends on the

effective management of the complex interplay of diverse instruments (Lehmann 2012; Rogge and Reichardt 2016; Rogge et al. 2017). For example, Ringeling (2005, 192) stressed that policy instruments must be viewed within the context of a

policy mix to understand their true impact; their effectiveness is shaped by their interconnection. Flanagan et al. (2011) emphasized that the dynamic interplay and trade-offs among these instruments define the essence of policy mixes. While policy designers hope that different policy instruments in a policy mix will generate complementary effects (Bressers and O'Toole 2005), other outcomes such as mutual exclusivity (Sorrell and Sijm 2003) and counterproductivity (Howlett and Rayner 2007) can occur.

Understanding how individuals respond to policy mixes, particularly those that aim to incentivize changes in individuals' cognition and behavior, has become a crucial question. Although the utilitarian view posits that incentives directly shape decisions, individuals' reactions to policy interventions are far more complex (Tang and Tang 2014). Ideally, policy instruments should be complementary, but sometimes one may overshadow the others (Grabosky 1995; Sorrell and Sijm 2003; Yi and Feiock 2012; Capano and Howlett 2020). Despite the growing recognition of their importance, significant gaps persist in both the theoretical understanding and practical application of designing effective policy mixes, particularly those aimed at altering individuals' cognition and behavior to achieve policy goals.

This study draws on behavioral public administration and policy studies to explore individuals' responses to policy mixes, predicting whether these mixes have complementary or conflicting effects (James et al. 2017; Capano and Howlett 2020; Esmark 2023). It posits that a deeper understanding of policy instrument interactions within a mix can be achieved by examining their foundational behavioral assumptions (Schneider and Ingram 1990; Olejniczak et al. 2020; Acciai and Capano 2021), that is, the mechanisms through which these instruments are expected to elicit the desired behaviors (Astbury and Leeuw 2010; Howlett 2018). We argue that the consistency of behavioral assumptions enhances the effectiveness of policy mixes designed to modify individuals' cognition and behavior. Given the complexity of responses to multiple incentives (Yang and Zhao 2023), diverse policy instruments, each with different behavioral assumptions, do not inherently complement one another (Datta and Mullainathan 2014). Aligning behavioral assumptions, particularly those targeting egoistic and altruistic motives—key drivers of human behavior (Batson and Shaw 1991; Cialdini 1991)—can improve outcomes. This dichotomy can clarify the behavioral assumptions and interactions within policy mixes (Krebs 1991; Riar et al. 2024). While compliance is commonly ego-driven (through the pursuit of rewards or the avoidance of punishments), it also occurs in response to altruism or concerns such as shame and self-esteem (Simon 1990; Frey and Jegen 2001; Beretti et al. 2013, 2019).

This study contributes to the policy mix literature in three key ways. First, it introduces the *Behavioral Assumption Consistency Framework*, which integrates egoistic and altruistic assumptions into policy design (Schneider and Ingram 1990; Olejniczak et al. 2020). This framework provides a systematic approach for examining how behavioral assumptions influence policy instrument effectiveness. Second, it highlights the importance of aligning behavioral assumptions within policy mixes, demonstrating that well-aligned mixes generate complementary effects,

whereas misaligned mixes may lead to counterproductive outcomes (Bowles 2008; Tang and Tang 2014). This contribution advances theoretical understanding by linking motivational dynamics with the design of policy instruments. Third, the study empirically tests these theoretical insights in a real-world policy context using a survey experiment. This application offers practical guidance for policymakers in designing more effective policies grounded in behavioral insights (Sanderson 2002).

Our empirical study focuses on the construction of nuclear power plant (NPP), a context characterized by increasing public opposition to such projects in China (Sun and Zhu 2014; Xia et al. 2019). In response, the government has implemented policy instruments like compensation, public participation, information disclosure, and site visits (Ministry of Ecology and Environment of the PRC 2002, 2017, 2020; State Council Information Office of the PRC 2019). The rapid expansion of the nuclear industry has necessitated the swift implementation of these instruments, which share the goal of increasing public acceptance but differ in approach and content (Zhou and Zhang 2010; Dai 2019; Zhou and Dai 2020). These include both compensatory and participatory instruments, often combined to engage both egoistic and altruistic motivations, addressing substantive outcomes and procedural legitimacy to build public trust and support (Wu 2017; Guo et al. 2024). To test the relationship between the consistency of behavioral assumptions and policy mix effectiveness, we conducted a survey experiment in 2021 in Huizhou City, Guangdong Province, China, where an NPP is being planned. Randomly assigning participants to four experimental scenarios, we collected 417 valid responses to compare public acceptance of the NPP. Our findings demonstrate that policy mixes with consistent behavioral assumptions are more effective in improving public acceptance.

The rest of this paper is organized as follows: Section 2 reviews the relevant literature and presents the theoretical framework. Section 3 describes the research design and methodology. Section 4 presents the results, and Section 5 discusses their implications. Finally, Section 6 concludes the paper.

## 2 | Literature Review and Theoretical Framework

### 2.1 | Behavioral Turn in Understanding Policy Instrument Interactions

Policy mixes are increasingly adopted to achieve complex goals, yet their interactions often produce varied and sometimes conflicting outcomes (Sorrell and Sijm 2003; Bressers and O'Toole 2005; Justen et al. 2014). Citizens frequently experience the effects of such mixes in their daily lives (Ingold et al. 2019), where instruments targeting distinct goals may conflict and inconsistently influence behaviors. Kern and Howlett (2009) observed that policy mixes developed over time can become counterproductive when newly added instruments are misaligned with existing goals. For example, rent control, while aimed at stabilizing housing costs, can conflict with construction subsidies intended to incentivize rental housing, leading to incoherence that undermines effectiveness. Conversely, Gunningham and Sinclair (1999) found that mixes like voluntarism combined with command-and-control instruments can

be complementary, as the latter sets a performance baseline while the former encourages additional improvements. These examples highlight that policy mixes are not inherently complementary and often yield chaotic outcomes (Howlett and Rayner 2007; Bouma et al. 2019).

Even when policy goals are similar, interactions between different instruments can lead to varied behavioral reactions and outcomes. In climate policy, for instance, pricing instruments such as taxes or cap-and-trade are often used alongside direct regulatory instruments such as emission quotas or standards, which can sometimes have counterproductive effects (Thurber et al. 2015; Osorio et al. 2020). Direct regulation may reduce emissions in less permit-dependent sectors, which in turn lowers permit prices and enables higher emissions in wealthier sectors (Roberts and Spence 1976; Christiansen and Smith 2015). In contrast, pricing instruments combined with adoption subsidies can be complementary; while subsidies alone may lower energy costs and increase demand (Murray et al. 2014), integrating them with carbon pricing discourages excessive energy use by raising costs at the consumption stage (van den Bergh et al. 2021; Font Vivanco et al. 2016; Freire-González 2020).

Research on the behavioral and psychological foundations of policy mix effectiveness has yielded varied outcomes. Gunningham and Sinclair (1999) argued that information-based instruments complement other instruments by enhancing the legitimacy of self-regulation instruments and supporting economic incentive instruments by informing rational decision-making. Contrastingly, Tørnblad et al. (2014) and Schall et al. (2016) found limited synergy between information-based instruments and economic incentives; this can be explained by the fact that economic incentives may overshadow the motivations targeted by information-based instruments (Drews et al. 2020). These studies have highlighted the importance of understanding how the behavioral mechanisms behind policy instruments shape their interactions and overall effectiveness.

The behavioral turn in evaluating policy instruments underscores the need to explore the mechanisms by which these instruments activate specific motivations (Bouma et al. 2019; Acciai and Capano 2021; Capano and Howlett 2021). These mechanisms, known as behavioral assumptions, refer to how policy instruments are expected to elicit desired behaviors (Astbury and Leeuw 2010; Howlett 2018). Accurately targeting these motivations enables policy instruments to achieve their goals (Capano and Howlett 2020). Given the complexity of individual responses to multiple incentives, it is crucial not to assume that diverse instruments with different behavioral assumptions are automatically complementary (Tang and Tang 2014).

Therefore, a detailed analysis of the behavioral assumptions underlying policy instruments is essential (Schneider and Ingram 1990; Olejniczak et al. 2020). This approach helps tailor policy instruments to the specific motivations of the target audience, maximizing the likelihood of achieving desired outcomes while minimizing unintended consequences (Fehr and Schmidt 1999; Bowles and Polanía-Reyes 2012). By aligning behavioral assumptions, policymakers can ensure that

instruments in a mix function consistently, enhancing overall effectiveness (Datta and Mullainathan 2014).

## 2.2 | Behavioral Assumptions Underlying Policy Instruments

Policy instruments aimed at changing individual behavior often assume that individuals, as utility maximizers, are primarily motivated by self-interest (Olejniczak et al. 2020). Incentive instruments are designed based on this assumption. Tax incentives, for example, encourage investment in strategic areas by reducing tax liabilities; governments assume that the direct economic benefit will drive behavior in line with policy goals (Zee et al. 2002). Similarly, instruments such as penalties or fines assume that individuals will act to avoid personal loss, further reinforcing self-interested behavior in response to policy measures (Schneider and Ingram 1990).

However, studies on behavioral assumptions linked to policy instruments have highlighted the complexity of human cognition and behavior in this regard (Tversky and Kahneman 1974; Kahneman 2011). For instance, cognitive dissonance may lead individuals to reject information that conflicts with their beliefs, diminishing the impact of information-based policy instruments (Festinger 1957). Additionally, the concept of bounded self-interest, where individuals balance self-interest with concerns for fairness and social norms (Mullainathan and Thaler 2000), can complicate the effectiveness of incentive-based policies; individuals might reject options that are personally beneficial but perceived as unfair or socially inappropriate (Fehr and Schmidt 1999). This complexity in human motivation means that, to be effective and socially acceptable, policy instruments must account for both egoistic and altruistic drives. Egoistic and altruistic motivations form a key dichotomy in human behavior; their societal impacts have been widely studied across disciplines including economics, psychology, and public administration (Simon 1990; Georgellis et al. 2011; Gomes and Domingos 2025).

Accordingly, altruistic motivations must be integrated into the behavioral assumptions of policy instruments (Mullainathan and Thaler 2000; Shafir 2013; Yang and Zhao 2023). Bounded self-interest reflects how individuals are driven by self-interest while also valuing fairness, reciprocity, and social norms, often limiting purely self-serving behavior (Jolls et al. 1998; Bosse and Phillips 2016). Policy instruments have been designed based on the belief that individuals are motivated by altruistic values like equality and harmony in addition to egoistic drives (Gouchoe et al. 2002). For example, carbon offset programs encourage investments in environmental projects to reduce emissions, appealing both to self-interest (e.g., regulatory cost reductions) and altruistic concerns for future generations (Kotchen 2009). Similarly, renewable energy incentive programs offer tax credits and subsidies; they leverage individuals' desire to combat climate change and protect the environment in addition to providing economic benefits (Menz 2005).

Existing analyses of the behavioral assumptions underlying policy instruments have often focused on bans and incentives that directly influence policy outcomes (Schneider and Ingram 1990;

Capano and Howlett 2020). However, procedural instruments aimed at managing policy demands, altering agendas, and shaping government legitimacy also play a crucial role in affecting individual behaviors (Howlett 2000, 2019). Although these instruments may not directly shape policy outcomes, they are essential components of a policy mix (Bali and Halpin 2021; Stark and Yates 2021; Bali et al. 2022; Virani et al. 2024). Instruments such as public participation are increasingly important, given that citizen input is becoming vital in all stages of public policy-making (Bali et al. 2021; Virani et al. 2024).

Public participation is a vital mechanism for enhancing transparency and legitimacy in decision-making processes, thereby increasing acceptance of policy outcomes (Terwel et al. 2014). When individuals are given the opportunity to express their views and contribute to decision-making, they have a greater sense of fairness and ownership over the outcome, increasing the likelihood that they support the final decisions (Beierle 1999; Webler and Tuler 2000; Batson et al. 2002; van der Does 2023). Moreover, public participation indirectly shapes policy outcomes by upholding key public values such as legitimacy, effective governance, and justice (Fung 2006, 2015). Public participation encourages individuals with strong civic values to engage with the public interest issues presented in the policy process (Bobbio 2019). Research has suggested that people with altruistic values are more inclined to participate in policy discussions (van der Werff and Steg 2016; Hoti et al. 2021; Sundqvist and Elam 2010).

Despite the importance of the behavioral assumptions underlying policy instruments, there remains a gap in the literature in this area. Namely, previous research has typically examined the influence of behavioral assumptions in the context of individual policy instruments (Schneider and Ingram 1990; Olejniczak et al. 2020). We advance the field by constructing a theoretical framework that examines the effects of combining multiple policy instruments with varied behavioral assumptions.

### 2.3 | Responses to Policy Mixes With Multiple Behavioral Assumptions

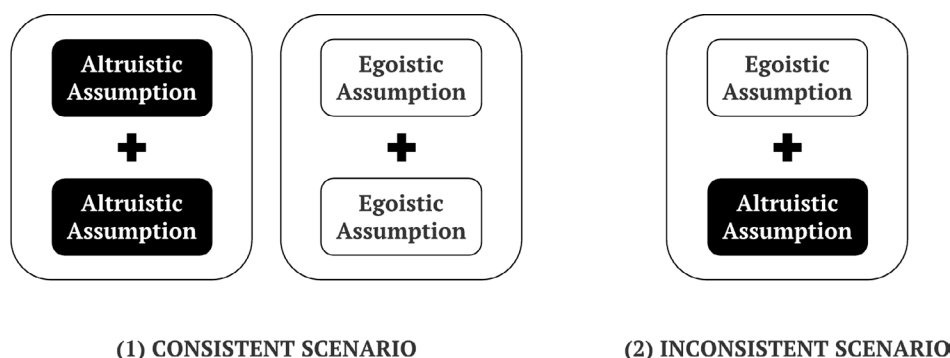
When individuals engage with multiple policy instruments, variations in their underlying behavioral assumptions may generate conflicts. We believe this explains why predicting policy mix effectiveness is challenging. In this section, we examine the

effects of combining policy instruments with varied behavioral assumptions, focusing on potential conflicts between egoistic and altruistic motivations. Simon (1990, 1993) posited that human choices are driven by a pair of motives; thus, an individual may act under the sway of either motive—manifesting as an “egoist” prioritizing personal interests or an “altruist” valuing public interests—depending on the context. However, it is implausible for an individual to simultaneously display behaviors driven equally by both motives in a single decision-making moment, as one motive typically exerts a dominant influence (Krebs 1991; Beretti et al. 2013, 2019; Underhill 2016; Riar et al. 2024).

We propose the *Behavioral Assumption Consistency Framework* for policy mixes to address the overlooked challenge of conflicting behavioral assumptions, which can undermine their effectiveness. Our framework, as shown in Figure 1, distinguishes between consistent scenarios, where all policy instruments align under one assumption, and inconsistent scenarios, where egoistic and altruistic assumptions coexist, potentially causing confusion or cognitive dissonance among individuals. By identifying such conflicts, this framework provides a systematic approach to understanding the mechanisms through which behavioral assumption inconsistencies affect individual decision-making and policy outcomes, offering valuable insights for designing more effective and coherent policy mixes (Schneider and Ingram 1990; Capano and Howlett 2020; Olejniczak et al. 2020).

Consistent scenarios arise when policy instruments are grounded in a single dominant behavioral assumption—either egoistic or altruistic—resulting in more predictable and coherent behavioral outcomes. In a consistent altruistic policy mix, individuals are assumed to prioritize collective benefits and social responsibility. For instance, combining community service programs with public education campaigns promotes collective well-being, raises awareness, and encourages community involvement in disaster recovery efforts. Public education enhances the impact of community service by fostering a shared sense of duty and increasing participation, leading to improved outcomes (Norris et al. 2008). This complementary effect occurs because both instruments align under the altruistic assumption that individuals are motivated by a desire to contribute positively to society.

In contrast, a consistent egoistic policy mix assumes that individuals act primarily out of self-interest, seeking to maximize



**FIGURE 1** | Behavioral assumption consistency framework for policy mixes.



personal benefits (Chong et al. 2001; Weeden and Kurzban 2017). For example, the combination of rewards and penalties is widely used in policy design, as it aligns with the egoistic assumption that individuals act based on personal cost–benefit calculations (Chen et al. 2015). Rewards increase the benefits of compliance, while penalties raise the costs of noncompliance, making compliance more likely through their combined effect (Vlaev et al. 2019). Scholars, such as Tang and Tang (2014), have identified this complementary interaction between policy instruments as one of the most effective approaches.

In inconsistent scenarios, policy instruments are based on contrasting egoistic and altruistic assumptions, appealing to opposing aspects of human motivation. Such a mix may result in inconsistent or contradictory public responses, as these conflicting motivations disrupt the translation of intention into action (Beretti et al. 2013). For example, efforts to reduce carbon emissions often pair a fuel tax (appealing to egoistic motives by increasing personal costs) with a campaign promoting public transport for environmental benefits (appealing to altruistic motives by encouraging collective responsibility). Instead of achieving the desired outcomes, these contradictory approaches may hinder positive behavioral motivations, as one type of motivation can undermine the other, reducing overall policy effectiveness (Underhill 2016; Bowles 2008; Georgellis et al. 2011).

Responses to policy mixes with inconsistent behavioral assumptions often depend on individuals' preferences (Tang and Tang 2014). When egoistic instruments dominate, individuals are more likely to prioritize personal benefits over collective welfare, exhibiting self-interested behaviors (Beretti et al. 2013; Dolšák et al. 2020). Conversely, when altruistic instruments are more prominent, individuals tend to align with public interests and support policies promoting collective benefits (Beretti et al. 2019). However, when egoistic and altruistic instruments exert equal influence, individuals may experience indecision and ambiguity in their preferences (Cialdini 1991). In such cases, conflicting motivations neutralize each other, resulting in ambiguous behavior where no clear direction emerges. This lack of decisive action prevents the achievement of policy goals, further hindering policy effectiveness (Jensen and Andersen 2015).

## 2.4 | Policy Mixes and Behavioral Assumptions in China's NPP Construction

The case of NPP construction in China provides a compelling context for analyzing the interplay between egoistic and altruistic assumptions within policy mixes. The rapid expansion of China's nuclear industry has necessitated the swift implementation of diverse policy instruments aimed at garnering public support, ranging from direct compensation to fostering public participation (Dai 2019; Wei et al. 2021; Guo and He 2024).

While our framework recognizes that coherent egoistic policy mixes can, in theory, be as internally consistent as altruistic ones, cultural and institutional environments may limit their practical applicability. In the context of China, a society historically guided by norms emphasizing collective safety and

public welfare, purely egoistic policy mix designs are inherently misaligned with the prevailing cultural and institutional landscape (Yan et al. 2020, 2021). In China's NPP construction, egoistic policy instruments, such as individual rewards, are rarely used alone but are combined with altruistic instruments like public engagement to align with norms of collective welfare and trust (Dai 2019; Guo and Wei 2019). Instead, policy designs often favor mixed or altruistic approaches that foster collective responsibility and trust, reflecting deeply rooted societal expectations. These cultural and institutional constraints not only influence the selection and implementation of policy instruments but also limit the theoretical exploration of coherent egoistic mixes in this context, where their practical relevance remains minimal.

We selected public participation and compensation as the focal policy instruments due to their theoretical significance and practical relevance. Theoretically, public participation is a cornerstone of democratic governance, fostering transparency, trust, and legitimacy in policy-making processes (Fung 2006, 2015), whereas compensation addresses fairness and equity by mitigating the tangible costs or externalities experienced by local communities (Mansfield et al. 2002; Lehtonen and Kojo 2019). Practically, these instruments are particularly pertinent in the context of NPP construction, where stakeholder concerns regarding safety, environmental impact, and socio-economic costs are paramount, especially in recent Chinese practice (Wu 2017; Guo et al. 2024). While other policy instruments, such as collaborative community activities and public education (Dai 2019), are also employed in practice, public participation and compensation sufficiently represent the theoretical foundations of egoistic and altruistic assumptions. These two instruments provide a robust framework for understanding and addressing trade-offs between collective and individual interests, aligning with best practices for high-stakes infrastructure projects.

One common policy instrument involves individual monetary compensation, which is based on an egoistic behavioral assumption; the government assumes that higher levels of public acceptance can be achieved by targeting individual financial gain (Kunreuther and Easterling 1996; Zaal et al. 2014; Lee et al. 2024). However, evidence shows this strategy can backfire, as monetary compensation often leads to decreased acceptance due to increased distrust toward the government (Tetlock et al. 2020). This paradox highlights the limitations of egoistic assumptions in policy design, especially when financial incentives are seen as attempts to buy off or bribe the public (Frey et al. 1996).

In response to challenges with monetary compensation, the government has increasingly adopted community public service compensation, a policy instrument grounded in altruistic assumptions (Mansfield et al. 2002; Lehtonen and Kojo 2019). We argue that community public service compensation is best conceptualized as a policy instrument grounded in altruistic assumptions for two key reasons<sup>1</sup>. First, residents' acceptance of community public service compensation is primarily driven by altruistic motivations, as it prioritizes collective and public interests over individual benefits. Unlike reciprocity, which involves expectations of future returns, altruism lacks such

conditionality (Thurnwald 1932; Alexander 1987; Guevara Beltran et al. 2023). While residents may incidentally benefit from improved community welfare, these benefits are secondary and do not drive their participation (Batson 2011; Barasch et al. 2014; Carlson and Zaki 2018). Second, community public service compensation reflects altruistic motivations through its net cost structure (Tullberg 2004). Unlike monetary compensation, which fully offsets costs and creates a transactional dynamic (Frey et al. 1996; Tetlock et al. 2020), it only partially mitigates individual costs. Residents continue to bear positive net costs, such as risks and disruptions from local NPP construction, while supporting broader public benefits like energy security and economic development. This design encourages contributions to collective welfare over personal gain (Cass et al. 2010; Terwel et al. 2014).

Recognizing that fostering altruistic motivations can mitigate opposition and enhance the perceived legitimacy of NPP construction, the government has increasingly adopted public participation policy instruments at various stages of NPP projects; this approach is in line with China's legal and regulatory requirements (Hoti et al. 2021). This type of instrument, as mentioned above, is based on an altruistic assumption; it encourages individuals to engage in decision-making processes for the collective benefit of the community rather than individual gain (Beierle 1999; van der Werff and Steg 2016; Hoti et al. 2021). By involving the public in discussions, consultations, and decision-making, the government aims to build trust and ensure that outcomes are perceived as fair and beneficial to all, thus reinforcing project legitimacy (Webler and Tuler 2000; Batson et al. 2002).

Building on the theoretical framework, we apply these concepts to the context of NPP construction, where public acceptance is a critical factor for policy success. In this setting, we hypothesize that policy mixes based on consistent behavioral assumptions are more likely to yield effective outcomes. For instance, community public service compensation combined with public participation (consistent altruistic assumptions) will generate more effective outcomes compared to a single altruistic policy instrument like community public service compensation alone. This leads to our first hypothesis:

**H1.** *Policy mixes based on consistent behavioral assumptions, as exemplified by altruistic scenarios, generate more effective outcomes than single policy instruments.*

Conversely, when policy mixes involve conflicting behavioral assumptions, such as combining individual monetary compensation (egoistic assumption) with public participation (altruistic assumption), the lack of alignment may limit their effectiveness. The inconsistency between egoistic and altruistic motivations within the mix could lead to public confusion or contradictory responses, preventing the mix from generating more effective outcomes than single policy instruments. This reasoning informs our second hypothesis:

**H2.** *Policy mixes based on inconsistent behavioral assumptions, such as combining egoistic and altruistic instruments, cannot generate more effective outcomes than single policy instruments.*

### 3 | Methodology and Research Design

#### 3.1 | Experimental Design

Our empirical analysis is based on policies implemented within China's nuclear energy sector, a regulatory environment characterized by a strong emphasis on risk mitigation, transparency, and public trust. These priorities reflect the broader cultural and institutional context, where policy designs are guided by collective safety norms and societal responsibility (Dai 2019; Yan et al. 2020). Given these conditions, coherent egoistic policy mixes—combinations of instruments entirely focused on individual-level incentives, such as financial rewards paired with penalties—are rarely employed without integration with complementary measures like public participation or educational initiatives. Instead, policy instruments tend to incorporate mixed or altruistic elements to foster trust and collective responsibility. Consequently, the policy landscape and data sources available for this study did not offer a scenario that fully embraced an egoistic principle, underscoring the cultural and institutional conditions shaping the design and implementation of policies in this sector. This context-driven limitation illustrates how cultural boundaries influence not only the selection of policy instruments but also the empirical feasibility of testing coherent egoistic policy mixes.

We incorporated an experimental component into our study design to strengthen the validity of causal claims. This approach addresses limitations commonly associated with cross-sectional surveys by creating controlled scenarios that capture public reactions to specific policy mixes (Gaines et al. 2007; James et al. 2017; Spector 2019). To create an immersive and contextually relevant experience for participants, we selected a city actively preparing for the construction of a NPP. This ensured that participants, as residents, could directly relate to the presented scenarios, fostering deeper engagement and eliciting authentic responses. Immersive designs encourage participants to consider real-world implications, making the findings more reflective of genuine preferences (Aguinis and Bradley 2014; King et al. 2013; Wulff and Villadsen 2020). By grounding the study in a globally significant issue, we highlight the broader relevance of this context to similar high-stakes policy challenges, where balancing individual costs and collective benefits is critical.

Our experimental design included four groups to evaluate the effects of single policy instruments and compare them with policy mixes (Table 1). Group 1 received individual monetary compensation, designed to measure the standalone effects of egoism-based incentives. Similarly, Group 3 focused on community public service compensation, allowing us to assess the impact of altruism-based incentives as a single policy instrument. These two groups serve as benchmarks, providing a basis for understanding the independent effects of single instruments. In contrast, Group 2 combined individual monetary compensation with public participation to examine the potential effects of an inconsistent policy mix, where incentives appeal to both egoism and altruism. Group 4, meanwhile, combined community public service compensation with public participation to explore the potential effects of a

**TABLE 1** | Four experimental scenarios.

		Compensation policy instrument	
		Individual monetary compensation (egoistic assumption)	Community public service compensation (altruistic assumption)
Public participation policy instrument	Without public participation	Group 1 (control group)	Group 3 (control group)
	With public participation (altruistic assumption)	Group 2 (inconsistent group)	Group 4 (consistent group)

consistent policy mix, aligning both components with altruistic motivations.

The survey experiment presented the different mixes of compensation and participation through standardized textual descriptions. Apart from the experimental treatments, all descriptions across the four scenarios were kept consistent to minimize the influence of extraneous variables<sup>2</sup>. Table 2 outlines these descriptions. Groups 1 and 2 were informed that they would receive individual monetary compensation, while Groups 3 and 4 were offered a community public service facility as compensation. Additionally, Groups 1 and 3 were told that compensation decisions were solely determined by the government and companies, whereas Groups 2 and 4 were informed they could participate in discussions to influence the final policy decisions.

Participants were recruited in early 2021 from Huizhou City, a region actively preparing for NPP construction. Recruitment took place in person at high-traffic locations, with eligibility criteria including local residency and being over 18 years old. Participants were randomly assigned to one of several experimental scenarios featuring different policies, described using textual materials designed to reflect real-world contexts and read aloud in one-on-one settings for clarity. After envisioning the government implementing the assigned policy, participants rated their acceptance of NPP construction using a 5-point Likert scale (1 = “totally unacceptable” to 5 = “totally acceptable”), alongside additional scales measuring perceived risk, benefit, knowledge, and trust. Reliability and validity were ensured through Cronbach’s  $\alpha$  and factor analysis. The complete questionnaire is provided in Appendix A.

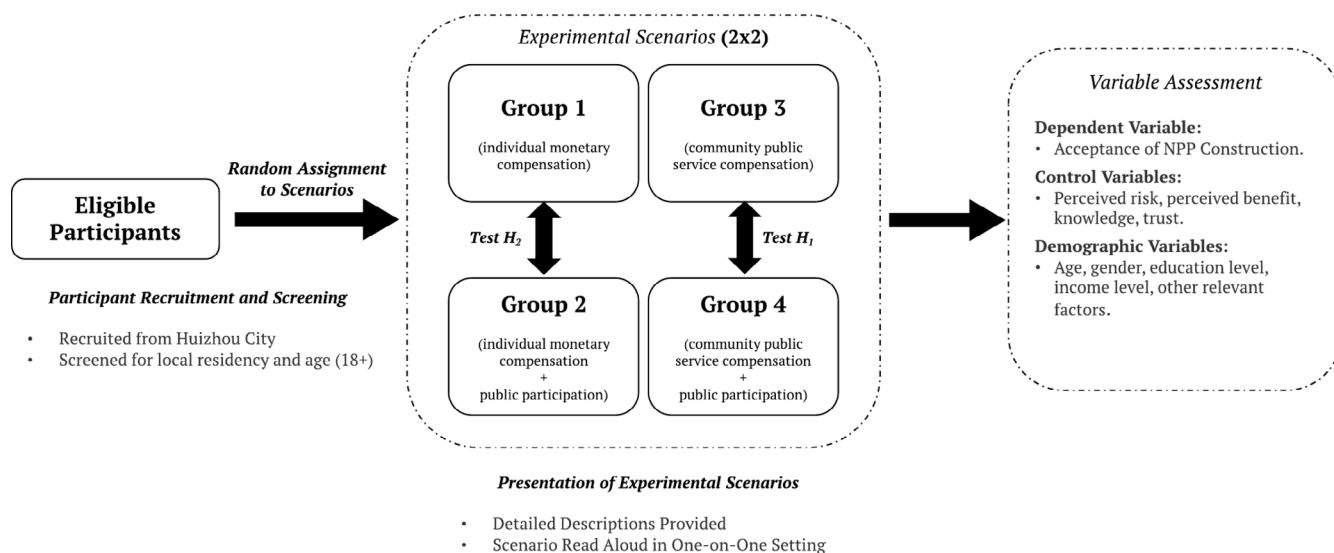
To facilitate understanding of the experimental process, Figure 2 provides a summary of the design, including participant recruitment, scenario assignment, and data collection.

### 3.2 | Data Collection

To determine the required sample size, we conducted a power analysis using G\*Power, a widely recognized program for power analysis in social and behavioral research (Faul et al. 2007, 2009). We set three key parameters: effect size,  $\alpha$  error, and statistical power. We adopted an effect size of 0.20, supported by Gignac and Szodorai’s (2016) review of 708 meta-analytically derived correlations, and aligned it with Funder and Ozer’s (2019) view that this value provides meaningful explanatory and practical utility for assessing policy mixes. With an  $\alpha$  error of 0.05 and a statistical power of 0.90 (Chen et al. 2024), the required total sample size was

**TABLE 2** | Description of experimental scenarios.

Treatment groups	Description of experimental scenarios
Group 1	The city has been selected as the site of a nuclear power plant. To get your support for the construction, the government and the nuclear power company will give you <i>a certain amount of money as compensation</i> . The amount and compensatory details are totally determined by the government and the company. <i>You are not allowed to participate</i> in the policy-making process.
Group 2	The city has been selected as the site of a nuclear power plant. To get your support for the construction, the government and the nuclear power company will give you <i>a certain amount of money as compensation</i> . The amount and compensatory details will be discussed by the government, the company, and residents. <i>You can participate</i> in the policy-making process.
Group 3	The city has been selected as the site of a nuclear power plant. To get your support for the construction, the government and the nuclear power company will <i>build a free public service facility for your community as compensation</i> which will improve the quality of public services in the community. The details are totally determined by the government and the company. <i>You are not allowed to participate</i> in the policy-making process.
Group 4	The city has been selected as the site of a nuclear power plant. To get your support for the construction, the government and the nuclear power company will <i>build a free public service facility for your community as compensation</i> , which will improve the quality of public services in the community. The details will be discussed by the government, the company, and residents. <i>You can participate</i> in the policy-making process.



**FIGURE 2** | Overview of the experimental design.

calculated to be 359 participants. Based on this calculation, we set the target sample size at 450 to ensure sufficient statistical power and to account for potential non-responses or incomplete data.

The survey area was selected to align with the geographic scope of NIMBY responses and capture the population most directly affected by the NPP construction. The sampling design follows safety and social impact evaluation guidelines (Ministry of Ecology and Environment of the PRC 2002), ensuring that the selected area represents the core impact region. We conducted stratified sampling proportional to the resident population in each street and township of Huiyang District based on official population data (see Appendix B). The sampling sites are shown in Figure 3, with numbers below each place name indicating the sampling quotas. This design ensures the study evaluates policy instruments in their intended context, providing insights into their interaction with the affected population.

### 3.3 | Balance Check

After collecting all responses, we rigorously screened for invalid answers using specific criteria, excluding those who failed the attention check, provided inconsistent answers, or left answers incomplete. This resulted in 417 valid responses, achieving an effective recovery rate of 92.26%. Participant engagement was maintained by reading questions and experimental material aloud to ensure data quality. Balance tests for key covariates, including age, gender, education, income, CPC membership, and hukou, confirmed the effectiveness of the random assignment, as no significant between-group differences were observed. Detailed results are provided in Appendix C.

### 3.4 | Analysis Methods

We employed various statistical methods to test our argument. First, a one-way ANOVA identified significant differences in NPP acceptance among the groups. Second, OLS regression tested the direct and interaction effects of policy instruments,

with robustness checks using a logistic model (Appendix E). Finally, a Two-way ANOVA examined the interaction effects between different types of compensation and public participation.

## 4 | Results

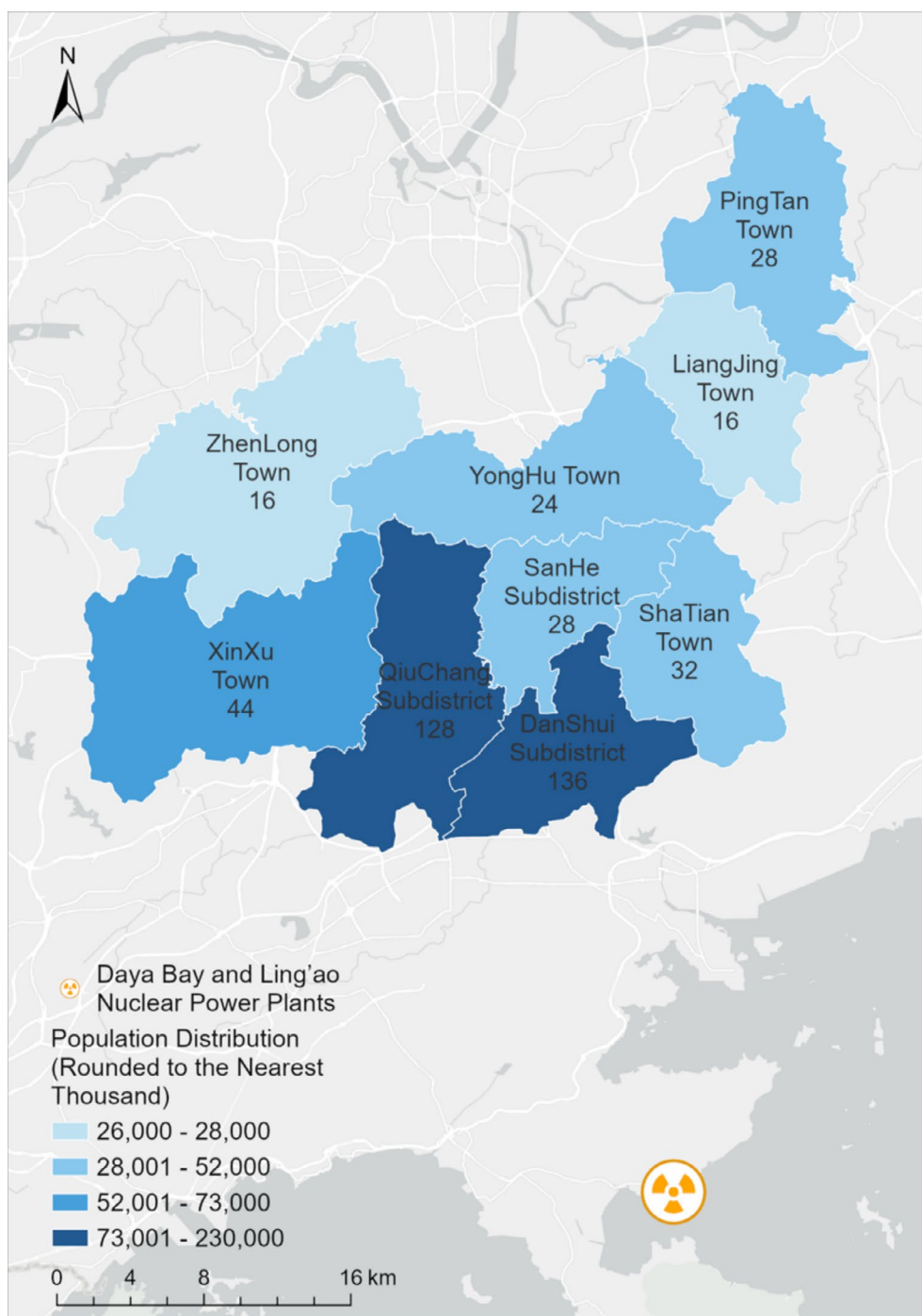
### 4.1 | Public Acceptance Significantly Differs Across Treatment Groups

The ANOVA test showed that the mean levels of public acceptance of NPPs differed among the four treatment groups ( $F = 4.260$ ,  $p = 0.006$ ). Figure 4 shows that the mean public acceptance of NPPs in the total sample was 3.254. In the treatment groups, this value ranged from 2.910 to 3.454.

We conducted a least significant difference (LSD) post hoc test to compare the mean acceptance levels across the groups (Table 3). The results highlight that the effectiveness of policy mixes varies based on the specific combination. For individual monetary compensation, no significant difference in acceptance was found between Group 1 (without public participation) and Group 2 (with public participation), suggesting a lack of significant synergistic effects when public participation was added. In contrast, for community public service compensation, Group 4 (with public participation) demonstrated significantly higher acceptance than Group 3 (without public participation), indicating that public participation substantially enhanced the effectiveness of this policy instrument. These findings reveal that policy mixes can either enhance or fail to enhance the effectiveness of single instruments, depending on the specific design. The results also revealed that Group 3 had the lowest acceptance, indicating that community public service compensation without public participation was the least effective policy instrument.

To further examine the impact of different policy mixes on public acceptance of NPPs, we conducted an OLS regression analysis using Group 3 (community public service compensation without public participation) as the reference group. Unlike the





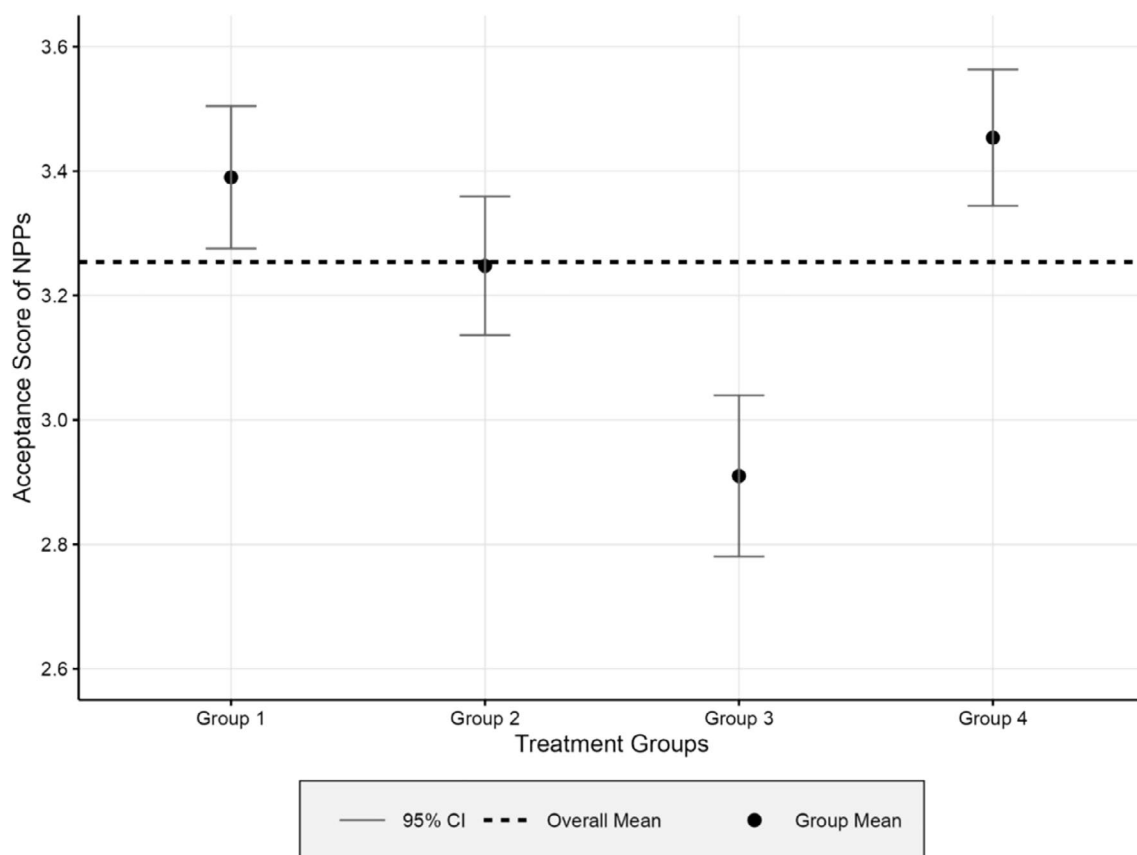
**FIGURE 3** | Sampling locations and quotas around daya Bay and Ling'ao nuclear power plants. The numbers below each place name indicate the sampling quotas for that area. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/jadm.13057)]

LSD post hoc test, this analysis controlled for perceived risk, perceived benefit, trust, knowledge, and demographic characteristics, providing a more robust estimate of group-level effects. The results (Table 4) showed that Group 4 (community public service compensation with public participation) had the highest positive impact on public acceptance compared to Group 3 (coefficient=0.452,  $p=0.005$ ), followed by Group 1 (individual monetary compensation without public participation, coefficient=0.278,  $p=0.073$ ) and Group 2 (individual monetary compensation with public participation, coefficient=0.258,  $p=0.088$ ). To further explore the underlying mechanisms

driving these differences, we conducted additional analyses, as presented in the next section.

#### 4.2 | Public Participation and Its Interaction With Compensation Type Significantly Increase Acceptance

Before conducting regression analysis, we first performed descriptive statistics to confirm the consistency of variable distributions and conducted a correlation analysis to examine



**FIGURE 4** | Mean public acceptance of nuclear power plants by treatment groups.

**TABLE 3** | LSD post hoc test for group differences in acceptance scores.

Mean difference of public acceptance of NPPs	Group 1	Group 2	Group 3	Group 4
Group 1 (individual monetary compensation without public participation)		−0.142	−0.480***	0.064
Group 2 (individual monetary compensation with public participation)	0.142		−0.338**	0.206
Group 3 (community public service compensation without public participation)	0.480***	0.338**		0.544***
Group 4 (community public service compensation with public participation)	−0.064	−0.206	−0.544***	

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

**TABLE 4** | OLS regression results for public acceptance of nuclear power plants by treatment group.

DV: Public acceptance of nuclear power plants	Coefficient	Robust standard errors	<i>t</i>	Significance level
Treatment group (Ref. Group 3)				
Group 1	0.278*	0.155	1.800	0.073
Group 2	0.258*	0.151	1.710	0.088
Group 4	0.452***	0.160	2.830	0.005

Note: The model includes control variables for perceived risk, perceived benefit, trust, knowledge, and demographic characteristics (e.g., age, gender, income, education, CPC membership, and hukou status). Group 3 (Community public service compensation without public participation) serves as the reference group. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Robust standard errors are reported.

relationships between variables, identifying potential multicollinearity issues (Table 5 and Figure 5). Detailed correlation coefficients are provided in Appendix D.

We employed OLS regression to examine the effects of compensation type and public participation on public acceptance of

NPPs (Table 6). Following Lu et al.'s (2021) recommendations for two-factor experiments, we used effect coding instead of dummy coding. Effect coding provides reasonable estimates of main and interaction effects, while dummy coding yields valid simple effects only when interaction terms are included in the regression model. In this study, individual monetary compensation and no

**TABLE 5** | Descriptive statistics of key variables.

Variable name	Observations	Mean	SD	Min	Max
NPP acceptance	417	3.254	1.200	1.000	5.000
Compensation type	417	−0.001	0.501	−0.500	0.500
Public participation	417	0.020	0.500	−0.500	0.500
Perceived benefit	417	0.000	0.753	−2.090	1.020
Perceived risk	417	0.000	0.815	−2.032	0.813
Knowledge	417	0.000	0.656	−1.606	0.915
Trust	417	0.000	0.765	−2.154	1.007
Gender	417	0.504	0.501	0.000	1.000
Education	417	3.314	1.131	1.000	7.000
Monthly income	396	2.780	1.352	1.000	6.000
Member of CPC	417	0.070	0.255	0.000	1.000
<i>Hukou</i>	417	0.345	0.476	0.000	1.000
Age	417	2.544	1.269	1.000	5.000

Note: The hukou system in China registers individuals as rural or urban residents, determining their legal residence and access to public services such as education, healthcare, and housing.

public participation were coded as −0.5, while community public service compensation and public participation were coded as 0.5.

As shown in Model 1 in Table 6, the main effect of compensation type on public acceptance of NPPs was negative but not statistically significant ( $p > 0.1$ ), indicating that differences in compensation type do not have a direct effect on public acceptance of NPPs. The main effect of public participation on public acceptance of NPPs was positive and significant ( $p < 0.1$ ). The regression results (Model 2 in Table 6) show that when considering the interaction effects, groups that had access to public participation showed higher acceptance. The interaction term in Model 3 shows that the combination of the two types of policy instruments had a highly significant positive effect on public acceptance ( $p < 0.05$ ). Thus, both policy mixes show better policy effects compared to either policy instrument alone.

To verify the robustness of our findings, we conducted an ordered logistic regression model as an alternative to the OLS model presented in the main analysis. The results, provided in Appendix E, confirm the robustness of our conclusions, as they exhibit similar signs and significance levels for key variables.

#### 4.3 | Aligned Behavioral Assumptions in Policy Mixes Drive Better Outcomes

To further analyze policy mix interaction effects, we adopted a two-factor experimental design and conducted two-way ANOVA (Table 7). Before conducting the analysis, we performed Levene's test for homogeneity of variance to evaluate whether the assumption of equal variances across groups was met. The test result ( $F = 0.668$ ,  $p = 0.572$ ) indicated no significant

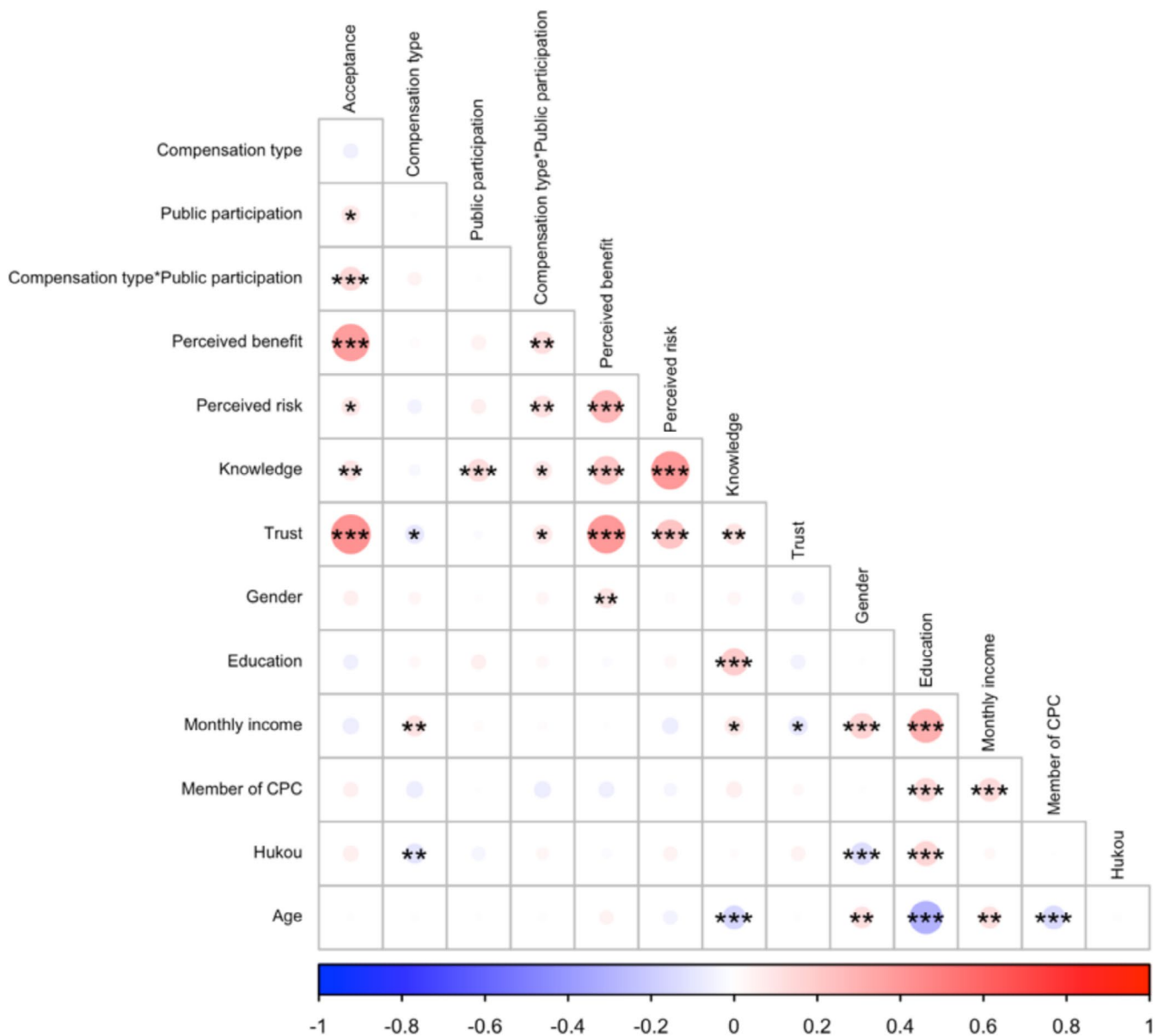
differences in variance between groups, satisfying the assumption required for proceeding with two-way ANOVA.

There was a significant positive interaction effect between public participation and community public service compensation ( $p < 0.01$ ), but no significant interaction effect with individual monetary compensation. Figure 6 shows that, compared to the provision of individual monetary compensation alone, the mix of public participation and individual monetary compensation showed a small but non-significant decrease in the mean value of public NPP acceptance ( $\Delta = -0.14229$ ,  $p > 0.1$ ).

The significant positive interaction between public participation and community public service compensation ( $p < 0.01$ ) supports Hypothesis 1; policy mixes with aligned behavioral assumptions produce more effective outcomes. Furthermore, the lack of a significant interaction between public participation and individual monetary compensation suggests that mixes with inconsistent assumptions fail to achieve complementary effects, consistent with Hypothesis 2.

## 5 | Discussion

Designing effective policy mixes requires accurate behavioral assumptions about the targeted population and alignment of these assumptions across all instruments. While prior studies highlight the importance of behavioral perspectives in policy mix effectiveness (Capano and Howlett 2020; Esmark 2023), the role of behavioral assumptions within mixes remains under-explored, especially in complex social contexts where multiple instruments interact (Schneider and Ingram 1990; Olejniczak et al. 2020; Acciai and Capano 2021). Our study addresses this gap by examining the behavioral effects of policy instruments and exploring how the consistency of behavioral assumptions



**FIGURE 5** | Correlation matrix of key variables. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

influences policy mix effectiveness. Focusing on mixes combining compensation and participation instruments, we argue that their underlying assumptions—egoism and altruism—represent a critical dichotomy in human behavior (Kunreuther and Easterling 1996; Mansfield et al. 2002; Zaal et al. 2014; Lehtonen and Kojo 2019). Understanding the interaction of these assumptions is crucial for evaluating incentive-based policy mixes (Schneider and Ingram 1990; Olejniczak et al. 2020; Riar et al. 2024).

Our survey experiment revealed that policy mixes based on consistent behavioral assumptions—specifically, community public service compensation combined with public participation—significantly improved public acceptance of NPPs. As predicted by  $H_1$ , when both policy instruments have the same motivations, they work synergistically to improve public attitudes (Schneider and Ingram 1990; Tang and Tang 2014). This aligns with the theoretical framework suggesting that consistent behavioral assumptions lead to more coherent and predictable behavioral

outcomes, which in turn enhance the effectiveness of policy mixes. The synergy between community public service compensation and public participation magnifies their individual effects, indicating that policymakers can achieve superior results by aligning behavioral assumptions across instruments.

Our findings further suggest that policy mixes with consistent behavioral assumptions not only outperform single policy instruments with the same behavioral assumption but also achieve better outcomes through strategic combinations. While altruistic policy mixes are as effective as egoistic instruments in increasing public acceptance, they offer additional benefits that make them particularly attractive, such as enhancing community cohesion and trust (Fung 2006, 2015; Lehtonen and Kojo 2019; Hoti et al. 2021). These positive spillover effects generate broader social benefits, making altruistic policy mixes a compelling option for policymakers (Batson and Shaw 1991; Beierle 1999; Webler and Tuler 2000; van der Werff and Steg 2016). By fostering a sense of collective responsibility and



**TABLE 6** | OLS regression results for policy instruments and interaction effects on public acceptance of nuclear power plants.

	DV: Public acceptance of nuclear power plants		
	Model 1	Model 2	Model 3
T <sub>1</sub> : Compensation type	−0.123 (0.117)	−0.137 (0.117)	−0.042 (0.108)
T <sub>2</sub> : Public participation	0.200* (0.118)	0.201* (0.117)	0.216** (0.108)
T <sub>1</sub> *T <sub>2</sub> : Interaction effect		0.686*** (0.233)	0.472** (0.221)
Control variables			
Perceived benefit			0.393*** (0.081)
Perceived risk			−0.146* (0.075)
Knowledge			0.035 (0.091)
Trust			0.509*** (0.081)
Gender			0.122 (0.109)
Education			−0.070 (0.053)
Monthly income			−0.039 (0.046)
Member of CPC			0.344 (0.248)
Hukou			0.204* (0.112)
Age			−0.016 (0.045)
Constant	3.250*** (0.059)	3.250*** (0.058)	3.472*** (0.221)
R <sup>2</sup>	0.010	0.030	0.261
N	417	417	396

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Robust standard errors are reported in parentheses.

mutual support, these mixes contribute to long-term community resilience and stability, reinforcing their role as a preferred strategy in policy design (Batson et al. 2002; Terwel et al. 2014; Bobbio 2019; Virani et al. 2024).

Conversely, the study found that policy mixes with inconsistent behavioral assumptions, such as the combination of individual monetary compensation (egoistic assumption) and public participation (altruistic assumption), did not significantly enhance public acceptance and, in some cases, even slightly reduced it. Supporting H<sub>2</sub>, this finding underscores the challenges of integrating policy instruments with conflicting

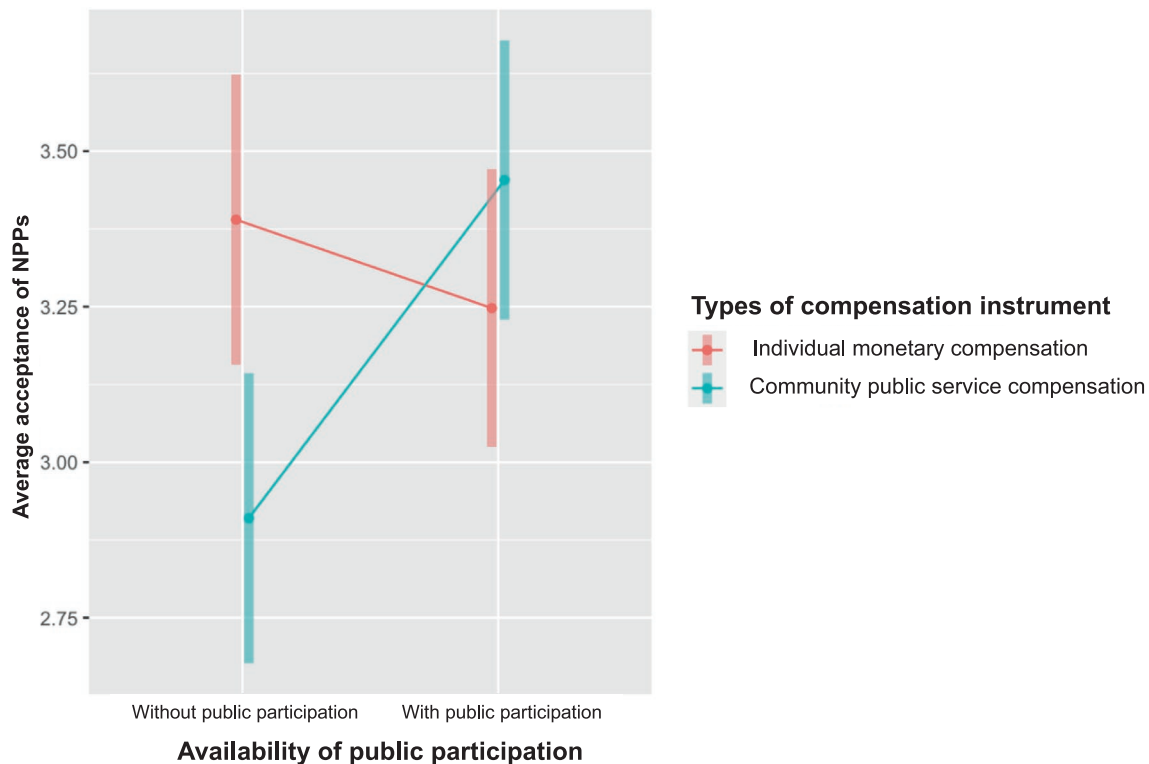
**TABLE 7** | Results of subgroup interaction effects.

	SS	MS	F	p
Compensation type	1.95	1.95	1.39	0.239
Public participation	4.19	4.19	2.98	0.085
Compensation type and public participation	12.24	12.24	8.7	0.003
Subgroup interaction with public participation				
Individual monetary compensation	0.97	0.97	0.69	0.407
Community public service compensation	15.06	15.06	10.71	0.001

underlying assumptions (Bowles 2008; Georgellis et al. 2011; Underhill 2016). The interaction between egoistic and altruistic motivations can create cognitive dissonance; individuals struggle to reconcile the competing incentives, ultimately reducing policy mix effectiveness.

The dissonance stems from conflicting motivations that pull individuals in different directions, leading to confusion and skepticism about the policy's intent (Festinger 1957; Georgellis et al. 2011; Underhill 2016). When policy instruments with opposing behavioral assumptions are combined, the policy risks being perceived as inconsistent and insincere, which can erode its credibility (Mansfield et al. 2002). For instance, monetary compensation implies a transactional dynamic, while promoting public participation calls for collective responsibility (Frey et al. 1996; Cass et al. 2010). This mixed messaging weakens the policy's legitimacy, making it harder to earn public trust and acceptance (De Fine Licht 2014; Tetlock et al. 2020). Additionally, conflicting incentives can lead to unintended outcomes, with individuals prioritizing egoistic rewards over altruistic participation, thereby diminishing the policy mix's effectiveness and fostering distrust in the policy-making process (Bowles 2008; Tang and Tang 2014). To avoid such pitfalls, it is crucial to align behavioral assumptions within policy mixes. Policymakers should either select instruments with a unified motivational foundation or clearly communicate how different elements of the policy mix work together, thus minimizing cognitive dissonance and enhancing public perception.

Policy mixes are not inherently superior to single policy instruments; their effectiveness hinges on the behavioral alignment of their components (Gunningham and Sinclair 1999; Kern and Howlett 2009; Bouma et al. 2019). Misaligned mixes, based on inconsistent behavioral assumptions, can reduce effectiveness or even produce counterproductive outcomes. For example, while community public service compensation combined with public participation achieved higher public acceptance than compensation alone, individual monetary compensation paired with public participation slightly underperformed compared to



**FIGURE 6** | Estimated marginal means of public acceptance of nuclear power plants. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/padm.13057)]

monetary compensation alone. These findings highlight that poorly aligned combinations may erode trust or create confusion, whereas well-aligned mixes can generate synergistic effects, where the whole exceeds the sum of its parts. Policymakers must critically assess whether a proposed mix reinforces or undermines its components, avoiding the assumption that combining tools is universally beneficial. A tailored, evidence-based approach is essential to maximize policy impacts and minimize unintended consequences.

While our study focuses on NPP construction, a context that typifies policies requiring trade-offs between individual costs and collective benefits, its findings provide valuable insights into policy design principles applicable to other domains requiring public support. For example, public health interventions, such as vaccination mandates or lockdown measures, often require individuals to make personal sacrifices for collective well-being (Sabat et al. 2020; Falk et al. 2023). These policies frequently employ a mix of instruments based on different underlying assumptions—some appealing to altruistic motives, such as promoting social responsibility, and others leveraging egoistic motives, like providing financial incentives. Similar to our studied context, this requires careful alignment of these assumptions across policy instruments within a policy mix. Misalignment in these assumptions can lead to conflicting signals, reducing public acceptance and policy effectiveness. The framework developed in our study underscores the importance of ensuring such consistency, offering practical guidance for policymakers seeking to design and implement effective policy mixes in urgent and high-stakes scenarios.

The absence of coherent egoistic policy mixes in our findings reflects the cultural and institutional context of China's nuclear energy sector, where norms emphasizing collective welfare and

public trust shape policy design. This highlights the influence of cultural boundaries on the applicability of the behavioral assumption consistency framework, underscoring the need to consider contextual factors when evaluating policy effectiveness. While our findings provide valuable insights into altruistic and mixed policy combinations, future research in more individualistic or market-driven environments could test the framework's generalizability and explore the potential effectiveness of egoistic mixes. These results emphasize the importance of aligning policy design with cultural and institutional conditions for optimal effectiveness.

## 6 | Conclusion

### 6.1 | Key Findings and Contributions

Behavioral alignment serves as the cornerstone of effective policy design. This study reveals that the effectiveness of policy mixes is significantly shaped by the alignment of the behavioral assumptions underlying the policy instruments. Empirical evidence from a survey experiment in Huizhou City, China, demonstrates that policy mixes with consistent behavioral assumptions, such as community public service compensation combined with public participation, are more effective in increasing public acceptance of NPPs. Conversely, mixes with conflicting assumptions, like individual monetary compensation and public participation, may result in diminished or counterproductive outcomes. These findings highlight the importance of aligning behavioral assumptions when designing policy mixes, particularly in contexts where public trust and acceptance are critical. Consistent behavioral motivations enhance the coherence and effectiveness of policy interventions, increasing their likelihood of success.

This study bridges behavioral science and policy mix research by introducing the behavioral assumption consistency framework, which offers a novel perspective on how egoistic and altruistic assumptions influence the design and effectiveness of policy instruments (Schneider and Ingram 1990; Olejniczak et al. 2020). Aligning these assumptions enhances complementary effects, improving policy outcomes, while misalignment risks counterproductive results. By applying this framework through a real-world survey experiment, our findings offer actionable insights for designing policies that balance individual costs and collective benefits.

Future research could extend this framework to diverse policy domains—such as public health, environmental sustainability, and urban development—investigating how behavioral assumption alignment shapes outcomes across contexts. Cross-cultural studies may reveal how socio-economic and cultural differences influence alignment effectiveness, providing global policy insights. Additionally, longitudinal and experimental designs could deepen the understanding of how behavioral motivations and policy effects evolve over time, broadening the framework's applicability to address complex societal challenges.

## 6.2 | Limitations and Future Research Directions

Like any research, this study is not free of limitations. First, focusing on a single, high-profile policy scenario limits the generalizability of our findings. The proposed NPP, as a high-profile policy issue, likely triggered intense public reactions due to its implications for safety and the environment. Lower-profile policies, however, may provoke weaker engagement (De Fine Licht 2014). While our study examines two specific policy mixes, further research should explore policy mixes across diverse contexts with varying levels of public concern and risk.

Second, designing this study around a single point in time and a single city presents several limitations that constrain the broader applicability of our findings (Porumbescu et al. 2017; Langella et al. 2023). The absence of a longitudinal component limits our ability to assess the long-term impacts of policy instrument mixes (Howlett et al. 2018; Bali et al. 2019; Howlett and Ramesh 2023). Additionally, restricting the study to a single city constrains the generalizability of our findings across different geographical and cultural contexts. These limitations underscore the need for future research to incorporate longitudinal designs and comparative studies across diverse settings to enhance the external validity of our findings.

Third, the focus on China's nuclear energy sector, shaped by cultural and institutional norms that prioritize collective welfare and public trust, limits the applicability of our findings to contexts with differing cultural or institutional frameworks. These conditions rarely support consistent egoistic policy mixes, restricting their empirical testing within our framework. This cultural bias may limit the generalizability of our findings to contexts where individualistic motivations play a more prominent role in policy formation and public response. Future research could explore individualistic or market-driven contexts to assess the applicability of such mixes and expand the framework's scope.

Finally, while the current sample size meets statistical requirements, expanding the sample in future studies to include data from multiple cities and time periods could better account for geographical, temporal, and cultural variations. This would not only enhance the external validity of the findings but also allow for a deeper understanding of smaller, more nuanced effects (Funder and Ozer 2019).

## Acknowledgments

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## Conflicts of Interest

The authors declare no conflicts of interest.

## Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request, with the understanding that restrictions may apply due to privacy and ethical considerations.

## Endnotes

<sup>1</sup> There is potential overlap between altruistic and reciprocal motivations in our conceptualization of community public service compensation. We acknowledge that employing the altruism-egoism dichotomy to classify motivations represents a rough simplification, as it does not capture the nuanced areas between these categories (Rocha and Ghoshal 2006). Some reciprocal motivations may in fact align closely with altruistic motivations, further blurring the distinction between these two constructs (Trivers 1971; Guevara Beltran et al. 2023). We suggest that future research could explore the complexity of motivations behind policy instruments, examining how altruistic, reciprocal, and other behavioral assumptions interact and influence citizens' behaviors and policy outcomes.

<sup>2</sup> The explicit treatment of omitted policy instruments in our study design was intentionally implemented to ensure factor orthogonality, a critical feature of factorial experiments. By making these omissions salient, we maintained the independence of all dimensions in the experimental design, allowing us to isolate and measure the causal effects of specific policy combinations (Collins et al. 2009; Wallander 2009). While this approach deviates from real-world practices—where policy omissions are often less explicit—it was necessary to enhance internal validity and ensure the robustness of our findings. Future research could explore the impact of information salience by comparing scenarios where omitted policy instruments are either explicitly highlighted or left implicit.

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## Appendix A

### Experimental Scenario, Survey Instrument, and Reliability Analysis

This appendix presents the key measures and reliability analysis for the survey used in this study. The table provides descriptions of the experimental scenarios, along with the constructs assessed in the survey. These constructs include perceived benefit, perceived risk, knowledge, trust, and acceptance of the proposed NPP. Additionally, demographic information such as gender, education level, personal income, party membership, *hukou* (Household Registration System), and age were also collected. For constructs with multiple items, reliability was evaluated using Cronbach's  $\alpha$ , ensuring the internal consistency of the measures. Table A1 provides the survey measures, scales, and corresponding reliability analysis, which form the foundation for the study's subsequent analysis.

**TABLE A1** | Survey measures, scales, and reliability analysis.

Section	Items	Scale	Cronbach's $\alpha$
Experimental Scenario and Interventions	1. Individual monetary compensation 2. Individual monetary compensation with public participation 3. Community public service compensation 4. Community public service compensation with public participation	/	/
Acceptance of Nuclear Power Plants	1. To what extent do you accept the construction of a nuclear power plant in your local area?	• Likert 1–5	/
Perceived Benefit	1. I agree that constructing a nuclear power plant locally will boost the local economy. 2. I agree that constructing a nuclear power plant locally will alleviate local electricity shortages.	• Likert 1–5	0.724
Perceived Risk	1. I agree that a nuclear power plant accident will cause catastrophic damage to the local ecosystem. 2. I agree that a nuclear power plant accident will have severe negative impacts on my health.	• Likert 1–5	0.798
Knowledge	1. I understand the effects of nuclear radiation on human health. 2. I am familiar with historical nuclear leakage incidents.	• Likert 1–5	0.602
Trust	1. I trust the government regarding nuclear power policies. 2. I trust nuclear power companies regarding safety and management.	• Likert 1–5	0.738
Gender	1. What is your gender?	• Male • Female	/
Education	1. What is your highest level of education?	• Primary school or below • Middle school • High school (including vocational school) • Associate degree • Bachelor's degree • Master's degree • Doctorate	/
Personal Income	1. What is your monthly personal income?	• 2000 RMB or below • 2001–4000 RMB • 4001–6000 RMB • 6001–8000 RMB • 8001–10,000 RMB • 10,000 RMB or above • Prefer not to answer	/
CPC Membership	1. Are you a member of the Communist Party of China?	• Yes • No	/

(Continues)



Section	Items	Scale	Cronbach's $\alpha$
Hukou (Household Registration System)	1. What is your household registration type?	<ul style="list-style-type: none"> <li>• Urban</li> <li>• Rural</li> </ul>	/
Age	1. What is your age group?	<ul style="list-style-type: none"> <li>• Under 18 years old</li> <li>• 18–24 years old</li> <li>• 25–34 years old</li> <li>• 35–44 years old</li> <li>• 45–54 years old</li> <li>• 55–65 years old</li> <li>• 65 years old or above</li> </ul>	/

## Appendix B

### Stratified Sampling by Administrative Division of Huiyang District

This appendix presents the stratified sampling approach used in this study, designed to ensure representativeness across the administrative divisions of Huiyang District. The sampling framework was based on the official resident population data for each division, with survey responses proportionally distributed. Population data were sourced from the Huiyang District Government (<http://www.huiyang.gov.cn/>), and Table A2 below details the number of sampled surveys and valid responses for each administrative division.

**TABLE A2** | Stratified sampling by administrative division of huiyang district.

Huiyang district administrative divisions	Official government resident population data	Number of sampled surveys	Number of valid answers
ShaTian Town	52,000	32	29
XinXu Town	72,998	44	39
ZhenLong Town	28,000	16	15
YongHu Town	40,000	24	23
LiangJing Town	26,609	16	17
PingTan Town	46,900	28	26
DanShui Subdistrict	230,000	136	122
QiuChang Subdistrict	220,000	128	120
SanHe Subdistrict	49,000	28	26
Total	765,507	452	417

Note: Population data are sourced from the Huiyang District Government Website.

## Appendix C

### Balance Test for Covariates

This appendix presents the balance test for covariates used to evaluate the effectiveness of the random assignment in this study. The balance test compares participants across the four treatment groups on key demographic variables, ensuring that any observed effects can be attributed to the experimental treatments rather than pre-existing differences.

To validate the random assignment, we tested for differences in age, gender, education, monthly income, CPC membership, and hukou among participants in the four groups. No statistically significant differences were found across these variables, as detailed in Table A3. These results confirm the randomization process was effective in achieving comparable groups.

**TABLE A3** | Demographic characteristics and between-group differences.

Variables	Group 1	Group 2	Group 3	Group 4	Between-group differences
Gender (male%)	50.0	47.7	50.0	53.7	$\chi^2 = 0.800$ ; $p = 0.849$
Age (25–30 years %)	28.0	25.7	25.0	28.7	$\chi^2 = 1.749$ ; $p = 1.000$
Education (High school%)	42.0	36.7	34.0	40.7	$\chi^2 = 21.289$ ; $p = 0.265$
Monthly income (4001–6000 yuan%)	35.7	37.5	28.3	29.4	$\chi^2 = 14.004$ ; $p = 0.525$
Member of CPC (no%)	93.0	89.9	93.0	96.3	$\chi^2 = 3.422$ ; $p = 0.331$
Hukou <sup>a</sup> (urban%)	43.0	35.8	30.0	29.6	$\chi^2 = 5.304$ ; $p = 0.151$

<sup>a</sup>The hukou system is a household registration system in China that determines an individual's legal residence and access to various public services. It classifies individuals as either rural or urban residents, affecting their eligibility for benefits such as education, healthcare, and housing.

## Appendix D

### Correlation Matrix of Key Variables

This appendix provides the correlation matrix for the key variables used in the analysis. Table A4 includes correlation coefficients in the upper triangle and their corresponding  $p$  values in the lower triangle, ensuring transparency in the relationships among variables.

**TABLE A4** | Correlation matrix of key study variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Acceptance	1.000	-0.052	0.083	0.141	0.374	0.083	0.096	0.424	0.050	-0.052	-0.063	0.052	0.056	-0.006
Compensation type	0.294	1.000	-0.002	0.041	0.016	-0.043	-0.026	-0.085	0.031	0.024	0.103	-0.065	-0.099	0.007
Public participation	0.089	0.963	1.000	-0.002	0.048	0.050	0.130	-0.011	0.007	0.050	0.016	-0.002	-0.040	-0.004
Interaction item	0.004	0.406	0.963	1.000	0.126	0.118	0.083	0.089	0.031	0.028	0.011	-0.065	0.032	-0.008
Perceived benefit	0.000	0.737	0.330	0.010	1.000	0.277	0.213	0.398	0.097	-0.016	0.004	-0.058	-0.019	0.045
Perceived risk	0.089	0.380	0.305	0.016	0.000	1.000	0.396	0.228	0.019	0.029	-0.063	-0.036	0.044	-0.045
Knowledge	0.049	0.600	0.008	0.090	0.000	0.000	1.000	0.107	0.036	0.191	0.085	0.060	0.013	-0.141
Trust	0.000	0.084	0.825	0.071	0.000	0.000	0.029	1.000	-0.032	-0.047	-0.086	0.023	0.046	-0.005
Gender	0.304	0.525	0.888	0.525	0.049	0.700	0.466	0.511	1.000	0.004	0.170	0.007	-0.126	0.112
Education	0.290	0.625	0.306	0.565	0.738	0.551	0.000	0.334	0.929	1.000	0.309	0.141	0.160	-0.294
Monthly income	0.209	0.040	0.752	0.827	0.940	0.213	0.089	0.088	0.001	0.000	1.000	0.139	0.024	0.116
Member of CPC	0.288	0.183	0.972	0.183	0.236	0.465	0.222	0.639	0.879	0.004	0.006	1.000	0.000	-0.140
Hukou	0.251	0.043	0.418	0.515	0.701	0.371	0.797	0.348	0.010	0.001	0.634	0.995	1.000	-0.010
Age	0.905	0.891	0.931	0.864	0.364	0.360	0.004	0.911	0.022	0.000	0.021	0.004	0.847	1.000

*Note:* The upper triangle reports the correlation coefficients, while the lower triangle displays the corresponding *p* values.

## Appendix E

### Ordered Logistic Regression as Robustness Check

This appendix presents the results of the ordered logistic regression model conducted as a robustness check for the OLS models. The ordered logistic model evaluates the impact of compensation type and public consultation on public acceptance of nuclear power. The results, detailed in Table A5, confirm the robustness of the main findings, with consistent signs and comparable significance levels for the key independent variables.

**TABLE A5** | Ordered logistic regression results for public acceptance of nuclear power.

	DV: Public acceptance of nuclear power plants		
	Model 1	Model 2	Model 3
T <sub>1</sub> :Compensation type	−0.153 (0.176)	−0.185 (0.178)	−0.042 (0.186)
T <sub>2</sub> :Public participation	0.284 (0.177)	0.297* (0.178)	0.342* (0.185)
T <sub>1</sub> *T <sub>2</sub> :Interaction effect		0.996*** (0.356)	0.793*** (0.383)
Control variables			
Perceived benefit			0.685*** (0.152)
Perceived risk			−0.295** (0.136)
Knowledge			0.097 (0.167)
Trust			1.001*** (0.162)
Gender			0.276 (0.189)
Education			−0.139 (0.093)
Monthly income			−0.034 (0.082)
Member of CPC			0.607 (0.449)
Hukou			0.325* (0.191)
Age			−0.026 (0.081)
Cut points			
Cut1	−2.113	−2.136	−2.924
Cut2	−1.162	−1.171	−1.792
Cut3	0.297	0.307	−0.014
Cut4	1.600	1.620	1.563
R <sup>2</sup>	0.003	0.009	0.104
N	417	417	396

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , and \*\*\* $p < 0.01$ . Robust standard errors are reported in parentheses.