Nuclear Engineering and Technology 51 (2019) 2034–2041

Contents lists available at ScienceDirect

Nuclear Engineering and Technology

journal homepage: www.elsevier.com/locate/net

Original Article

# Moderating effect of regulatory focus on public acceptance of nuclear energy

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ARTICLE INFO

*Article history:*
Received 10 December 2018
Received in revised form
21 May 2019
Accepted 2 June 2019
Available online 5 June 2019

*Keywords:*
Public acceptance
Nuclear energy
Regulatory focus
Moderating effect

ABSTRACT

Public acceptance has become the most critical question for sustainable development of nuclear energy in recent decades. Many researches concentrated on risk and benefit perception, which were deemed as the most influential factors of Public Acceptance of Nuclear Energy (PANE). But few researches focused on psychological factors including regulatory focus. Therefore, this paper aimed to explore the moderating effect of regulatory focus on PANE based on Regulatory Focus Theory in order to find ways to increase/decrease PANE. An Internet-based survey had been carried out in China nationwide. The results indicated that trust in government was positively related to PANE and this relationship was mediated by risk and benefit perception. In addition, the strength of the associations between risk and benefit perception and PANE were moderated by regulatory focus, consisting of prevention focus and promotion focus. Prevention focus strengthened the negative relationship between risk perception and PANE, while promotion focus weakened. Moreover, promotion focus weakened the positive relationship between benefit perception and PANE, but no significant moderating effect of prevention focus was founded on the relationship between benefit perception and PANE. Some policy implications were also proposed on the basis of above-mentioned findings.


## 1. Introduction

As Weinberg [1] noted “the public perception and acceptance of nuclear energy has emerged as the most critical question concerning the future of nuclear energy”, Public Acceptance of Nuclear Energy (PANE) had attracted widespread attention in recent years. Especially after the Fukushima Daiichi accident in 2011, PANE has dramatically impacted the policy and development of nuclear energy. International Atomic Energy Agency (IAEA) pointed out that “public acceptance is a key factor for the future of nuclear power” [2] and this case was especially distinct for China [3], who had an aggressive plan to develop nuclear energy [4,5]. Therefore researches on PANE is necessary to carry out in China to ensure the sustainable development of nuclear energy [6].

The previous studies demonstrated that risk perception and benefit perception were the most influential factors to PANE [4–13]. Besides risk perception and benefit perception, there were also other influencing factors from social, cultural and historical perspectives, such as knowledge, trust in government, etc. [9]. Bryant et al. [14] suggested that the decision-making of a new risky technology could not simply be explained in terms of risks and benefits, and had to take the public’s regulatory focus into consideration. So it was time for the study to move beyond just cost-benefit analysis to the psychological process and motivation of decision-making. This paper aimed at the psychological process of decision-making and analyzed the moderating effect of regulatory focus on PANE based on the well-accepted Regulatory Focus Theory (RFT).

RFT [15,16] was proposed by Higgins in 1997 to explain the ‘approach pleasure and avoid pain’ phenomenon. RFT distinguishes individuals’ regulation orientation into two categories: the promotion focus and the prevention focus. RFT proposes an explanation on individuals’ belief, behavioral tendency [17–20], and

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https://doi.org/10.1016/j.net.2019.06.002

cognitive behavior [21–23]. Therefore, it has been widely accepted and applied in different fields, i.e., marketing [23], shopping behavior [24], finance [25], leadership effectiveness, etc. [26]. But up-to-now there was no application of RFT founded in PANE. Could RFT be applied in PANE? What is the difference of decision making between nuclear energy and other fields? Is PANE also affected by individuals' regulatory focus? We were interested in investigating these problems in this paper.

As public goods, nuclear facilities' benefits are shared by the whole society (e.g., energy supply, reduction of carbon emission, and mitigation of climate change) [27], but nuclear facilities' risks are endured only by the nearby residents (e.g., radioactive risk to the unknown and uncontrollable consequences) [28,29]. Therefore, the decision-making and the process of 'approach pleasure and avoid pain' in nuclear energy may be different from other technologies, whose benefits and risks are burdened by the same group. That makes the decision-making process much more complicated and this is why we investigate PANE based on RFT.

This study aimed to investigate the moderating effects of promotion focus and prevention focus on PANE in order to find ways to increase/decrease PANE. This paper was organized as follows. Section 2 presented a literature review. Section 3 proposed a conceptual framework model and introduced the methodology. Section 4 presented the results and discussions. Section 5 concluded this paper with some policy implications.

## 2. Literature review

### 2.1. Trust, risk perception, benefit perception and public acceptance

As mentioned above, the research of PANE attracted lots of attention from the research community. The previous study concentrated on the influencing factors on PANE and proposed that many factors, including risk perception, benefit perception and trust in government, would impact PANE through a direct/indirect way. Michael Siegrist et al. [30] found trust had a positive influence on benefit perception and a negative influence on risk perception. Siegrist et al. [31] concentrated on the distinction between trust and confidence. Based on a survey in Switzerland, their study founded that both general trust and general confidence negatively influenced risk perception, which notably impacted PANE. Visschers et al. [32] investigated the influences of risk perception, benefit perception and social trust on PANE, in which benefit perception was divided into benefit for climate change and benefit for the energy supply. Their study found that PANE was mainly influenced by benefit perception for security energy supply and to a lesser extent by benefit perception for climate change. Visschers et al. [10] conducted a longitudinal study based on two surveys just before and after Fukushima Daiichi nuclear accident and investigated the relationship among risk perception, benefit perception, trust and PANE. They suggested that trust had a strong effect on risk perception and benefit perception, which determined PANE both before and after the accident. Xiao et al. [13] divided trust into goodwill trust and competence trust, and analyzed their different influences on PANE. The results demonstrated that goodwill trust improved PANE by decreasing risk perception while competence trust improved PANE by increasing benefit perception. Guo et al. [7] compared the sensitivity of PANE according to the distances from the people's residence to the nuclear facilities. Their study showed that both benefit perception and risk perception significantly influenced public acceptance through emotional identification and social trust. Wang et al. [6] examined the role of benefit perception, risk perception and trust on PANE and founded that both benefit perception and risk perception had a significant positive relationship with public acceptance. Ho et al. [33] explored the effects of benefit perception, risk perception and trust on PANE in Thailand and Vietnam, who had not nuclear energy nowadays but did plan to import. Their study showed that participants in both countries preferred economic benefits to environmental benefits and deemed nuclear accidents as the major risk.

From the literature mentioned-above, risk perception, benefit perception and trust were the mostly concentrated factors affecting PANE.

### 2.2. Regulatory focus theory

RFT proposes two motivational orientations including: (a) aspirations and accomplishments (promotion focus) and (b) responsibilities and safety (prevention focus) [15]. Individuals with a promotion focus form their attitudes and regulate their behaviors to attain advancement, growth, and accomplishment. Meanwhile, individuals with a prevention focus form their attitudes and regulate their behaviors to ensure safety and responsibility [16,17,34,35]. Generally, promotion focus concentrates on seizing opportunities, achieving gains and avoiding no-gain, whereas prevention focus concentrates on preventing errors, achieving no-loss and avoiding losses [36].

Since its being proposed in 1997 [15], RFT has been applied to explain the people's behavioral intention, attitude and decision-making [14,25,37–41] in various fields such as organizational behavior [26,42,43], technology acceptance [19,44], online marketing, shopping behavior, etc. [23,41]. Recently, some pilot studies also tried to apply RFT to nuclear energy. For example, Mannetti et al. [45] investigated how the impact of persuasive messages in nuclear energy could be improved by regulatory focus and Beck et al. [46] attempted to assess experts' regulatory focus in nuclear power plant control. However, to the best of our knowledge there has been no application of RFT to the empirical research of PANE.

Higgins [15] considered that regulatory focus represented a persistent personality trait. Baron et al. [47] suggested that personality and contextual factors were often introduced as the moderators. Most of the previous studies had also deemed regulatory focus as moderating variables [42,43,48,49]. Therefore, prevention focus and promotion focus were treated as the moderator variables in our study.

We also made the following hypotheses that both the positive association between benefit perception and PANE and the negative association between risk perception and PANE were moderated by regulatory focus.

## 3. Methods

### 3.1. Model

A conceptual model was proposed based on the literature review, as shown in Fig. 1. PANE was the dependent variable and trust in government was the independent variable. Risk perception and benefit perception were mediating variables. Prevention focus and promotion focus were moderating variables. This conceptual model would be verified by the empirical research.

### 3.2. Sample and data collection

An Internet-based survey was conducted in August 2017 following a pre-survey test to enhance the understandability and veracity of scales. 973 questionnaires were received but 2 of them were invalid. The demographic characteristics of the 971 valid participants were presented in Table 1. The data from the questionnaires were analyzed using SPSS Statistics 21.0. The main statistical analyses in this study included the descriptive analysis,

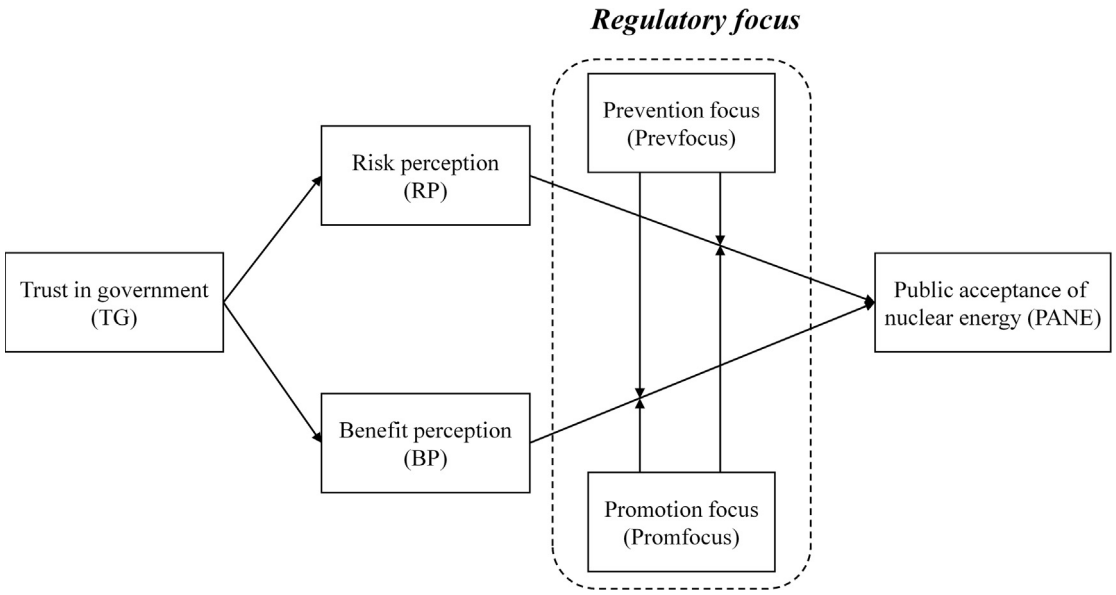


**Fig. 1.** Conceptual framework of the independent, mediating, moderating and dependent variables.

**Table 1**
Demographic characteristics of the respondents (N = 971).

| Item | Content | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 637 | 65.60% |
| | Female | 334 | 34.40% |
| Age | Under 20 | 41 | 4.20% |
| | 21–30 | 436 | 44.90% |
| | 31–40 | 325 | 33.50% |
| | 41–50 | 127 | 13.10% |
| | 51 and above | 42 | 4.30% |
| Urban or rural resident | Urban resident | 437 | 45.00% |
| | Rural resident | 534 | 55.00% |
| Profession | Administrative organ | 100 | 10.30% |
| | Institutional Organization | 215 | 22.10% |
| | Enterprise | 318 | 32.70% |
| | Freelance | 158 | 16.30% |
| | Students | 109 | 11.20% |
| | Farmer | 52 | 5.40% |
| | Others | 19 | 2.00% |
| Yearly household income | Less than ¥30,000 | 108 | 11.10% |
| | ¥30,000–80,000 | 364 | 37.50% |
| | ¥80,000–300,000 | 436 | 44.90% |
| | More than ¥300,000 | 63 | 6.50% |
| Educational level | Primary school and below | 11 | 1.10% |
| | Junior high | 84 | 8.70% |
| | Senior high (including junior college) | 221 | 22.80% |
| | Undergraduate | 539 | 55.50% |
| | Postgraduate and above | 116 | 11.90% |

factor analysis, regression analysis, and the moderated mediation effect analysis.

### 3.3. Measurement

Most of measurement items were based on the previous literature so as to enhance and ensure the validity of measurement. In order to avoid the semantic differences between Chinese and English, all English measurements were first translated into Chinese by the experts in nuclear safety and risk management. Then, the Chinese measurements were translated back to English. Finally, a pretest was carried out, and some terms were modified according to the specific research context. 5-point Likert scales (i.e., 5 = strongly agree; 4 = agree; 3 = no opinion; 2 = disagree; 1 = strongly disagree) were used to measure all items regarding trust in government, risk perception, benefit perception, prevention focus, promotion focus and PANE.

PANE was measured using a 3-item scale adapting from Tsujikawa et al. [50]. The items were as follows: “I am in favor of nuclear power generation”, “Nuclear power generation is an excellent way to generate electricity”, and “Nuclear power generating plants should be increased”.

Trust in government was measured using an 11-item scale adapting from McKnight et al. [51]. The example items were as follows: “I believe that Government would act in my best interest”, “Government is truthful in its dealings with me” and “Government is competent and effective in providing legal advice”.

Following Slovic [29], we measured risk perception by using a 9-

**Table 2**
Loadings, Cronbach's α, composite reliability and AVE.

| Variables | Cronbach's α | Factors loading | Composite reliability | AVE |
|---|---|---|---|---|
| PANE | 0.866 | 0.869–0.908 | 0.918 | 0.789 |
| TG | 0.959 | 0.793–0.883 | 0.964 | 0.711 |
| RP | 0.928 | 0.711–0.843 | 0.940 | 0.637 |
| BP | 0.719 | 0.771–0.841 | 0.844 | 0.643 |
| PrevFocus | 0.836 | 0.862–0.878 | 0.903 | 0.756 |
| PromFocus | 0.831 | 0.859–0.868 | 0.899 | 0.748 |

Notes: PANE, public acceptance of nuclear energy; TG, trust in government; RP, risk perception; BP, benefit perception; PrevFocus, prevention focus; PromFocus, promotion focus; AVE, average variance extracted.

item scale divided into dread risk and unknown risk. Dread risk was measured as follows: "We still have a lack of control over the occurrence of a nuclear accident", "The construction of nuclear power plant is dread for me", "Nuclear power plant has catastrophic potential threats", "The disaster of the nuclear accident is fatal" and "Nuclear power plant brings risks more than benefits". Unknown risk was measured as follows: "The hazards of nuclear power plant are unobservable", "The construction of a nuclear power plant will bring unknown risks", "The nuclear power plant is a new risk", and "The manifestation of harm of the nuclear power plant is delayed".

Benefit perception was measured using a 4-item scale adapting from Visschers et al. [52]. The benefit perception of nuclear energy included security energy supply, climate change mitigation, reducing the price of electricity and sustainable energy supply.

Regulatory focus was measured using a 6-item scale adapting from Shin et al. [53], relating to prevention focus and promotion focus. Prevention focus was measured according to the following 3 items: "Security is an important factor for me", "I focus my attention on avoiding failure", and "I am very careful to avoid exposing myself to potential losses." Promotion focus was measured according to the following 3 items: "A chance to grow is an important factor for me", "I focus on accomplishing job tasks that will further my advancement," and "My action priorities are impacted by a clear goal".

Five variables were selected as control variables in the model that might affect PANE, including gender, age, urban or rural resident, educational level and yearly household income.

## 4. Results and discussions

### 4.1. Factor analysis

#### 4.1.1. Validity and reliability

The results of loadings, Cronbach's α, composite reliability, and Average Variance Extracted (AVE) were showed in Table 2. The values of loadings, Cronbach's α and composite reliability were all above the suggested threshold of 0.70, which confirmed the measurement's reliability. All the AVE scores were higher than the 0.50 criterion, indicating that the convergent validity of our measurement model was verified. As shown in Table 3, the comparison of correlations among constructs and the square root of the AVE scores were done to evaluate the discriminant validity of the items. The square root of the AVE scores for each construct was higher than the correlations among the constructs, thus confirming the discriminant validity.

#### 4.1.2. Descriptive statistics and intercorrelations

The means, standard deviations and correlations for all variables were summarized in Table 3. As shown in Table 3, trust in government was positively related to PANE ($r = 0.492$, $p < 0.001$) and benefit perception ($r = 0.480$, $p < 0.001$), where r was Pearson correlation coefficient and p was significant level. While trust in government was negatively related to risk perception ($r = -0.081$, $p < 0.05$). Moreover, risk perception was negatively related to PANE ($r = -0.163$, $p < 0.001$). Benefit perception was positively related to PANE ($r = 0.515$, $p < 0.001$).

### 4.2. Regression analysis

The results of hierarchical moderated regression analysis were shown in Table 4. Trust in government was significantly negatively related to risk perception ($\beta = -0.073$, $p < 0.05$, Model 2), where p was significant level and β was regression coefficient. But trust in government was significantly positively related to benefit perception ($\beta = 0.468$, $p < 0.001$, Model 4) and PANE ($\beta = 0.484$, $p < 0.001$, Model 6). Risk perception was significantly negatively associated with PANE ($\beta = -0.127$, $p < 0.001$, Model 7). Benefit perception was significantly positively associated with PANE ($\beta = 0.363$, $p < 0.001$, Model 7). Moreover, the effect of trust in government on PANE ($\beta = 0.305$, $p < 0.001$, Model 7) was smaller when risk perception and benefit perception were added in the regression equation, indicating that risk perception and benefit perception had mediating effects on the relationship between trust in government and PANE.

The results in Table 4 revealed that, the interaction between prevention focus and risk perception was negatively related to PANE ($\beta = -0.124$, $p < 0.01$, Model 9). The interaction between prevention focus and benefit perception on PANE was not significant ($\beta = 0.050$, ns, Model 9). The interaction between risk perception and promotion focus was positively related to PANE ($\beta = 0.106$, $p < 0.05$, Model 9). The interaction between benefit perception and promotion focus was negatively related to PANE ($\beta = -0.086$, $p < 0.05$, Model 9). Fig. 2, Fig. 3 and Fig. 4 showed plots for these interactions. Fig. 2 showed that risk perception was more negatively related to PANE when prevention focus was high rather than low. Fig. 3 showed that risk perception was more negatively to

**Table 3**
Means, standard deviations, correlations and square roots of AVE (N = 971).

| Variables | Mean | SD | PANE | TG | RP | BP | PrevFocus | PromFocus |
|---|---|---|---|---|---|---|---|---|
| PANE | 3.717 | 1.021 | 0.888 | | | | | |
| TG | 3.584 | 0.874 | 0.492*** | 0.843 | | | | |
| RP | 2.872 | 0.982 | −0.163*** | −0.081* | 0.798 | | | |
| BP | 3.504 | 0.845 | 0.515*** | 0.480*** | −0.013 | 0.802 | | |
| PrevFocus | 3.890 | 0.830 | 0.344*** | 0.434*** | −0.021 | 0.386*** | 0.869 | |
| PromFocus | 3.876 | 0.762 | 0.353*** | 0.440*** | −0.029 | 0.381*** | 0.740*** | 0.865 |

Notes.
a) Values on the diagonal are the square roots of AVE of each scale; unadjusted correlations appear below the diagonal.
b) *p < 0.05, **p < 0.01, ***p < 0.001.
c) PANE, public acceptance of nuclear energy; TG, trust in government; RP, risk perception; BP, benefit perception; PrevFocus, prevention focus; PromFocus, promotion focus; SD, standard deviations; AVE, average variance extracted.

**Table 4**
Results of regression (N = 971).

| Variables | RP | | BP | | PANE | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model1 | Model2 | Model3 | Model4 | Model5 | Model6 | Model7 | Model8 | Model9 |
| Gender | 0.116*** | 0.115*** | −0.056 | −0.044 | −0.099** | −0.086** | −0.055* | −0.058* | −0.059* |
| Age | −0.031 | −0.026 | 0.052 | 0.024 | 0.048 | 0.018 | 0.006 | 0.000 | −0.005 |
| Urban or rural resident | −0.054 | −0.050 | 0.038 | 0.014 | 0.043 | 0.018 | 0.007 | 0.011 | 0.011 |
| Education level | −0.042 | −0.038 | 0.041 | 0.017 | 0.036 | 0.011 | 0.000 | −0.013 | −0.013 |
| Yearly household income | 0.039 | 0.044 | 0.095** | 0.061* | 0.050 | 0.015 | −0.001 | 0.004 | 0.006 |
| TG | | −0.073* | | 0.468*** | | 0.484*** | 0.305*** | 0.267*** | 0.263*** |
| RP | | | | | | | −0.127*** | −0.127*** | −0.134*** |
| BP | | | | | | | 0.363*** | 0.337*** | 0.332*** |
| Prevfocus | | | | | | | | 0.039 | 0.038 |
| Promfocus | | | | | | | | 0.076 | 0.071 |
| PrevFocus * RP | | | | | | | | | −0.124** |
| PromFocus * RP | | | | | | | | | 0.106* |
| PrevFocus * BP | | | | | | | | | 0.050 |
| PromFocus * BP | | | | | | | | | −0.086* |
| $R^2$ | 0.020 | 0.025 | 0.024 | 0.238 | 0.021 | 0.250 | 0.364 | 0.372 | 0.381 |
| $\Delta R^2$ | 0.020 | 0.005 | 0.024 | 0.214 | 0.021 | 0.229 | 0.113 | 0.008 | 0.009 |
| F | 3.913** | 4.132*** | 4.686*** | 50.126*** | 4.212** | 53.655*** | 68.681*** | 56.857*** | 42.001*** |
| ΔF | 3.913** | 5.141* | 4.686*** | 270.773*** | 4.212** | 294.468*** | 85.529*** | 6.449** | 3.425** |

Notes.
a) *p < 0.05, **p < 0.01, ***p < 0.001.
b) PANE, public acceptance of nuclear energy; TG, trust in government; RP, risk perception; BP, benefit perception; PrevFocus, prevention focus; PromFocus, promotion focus.

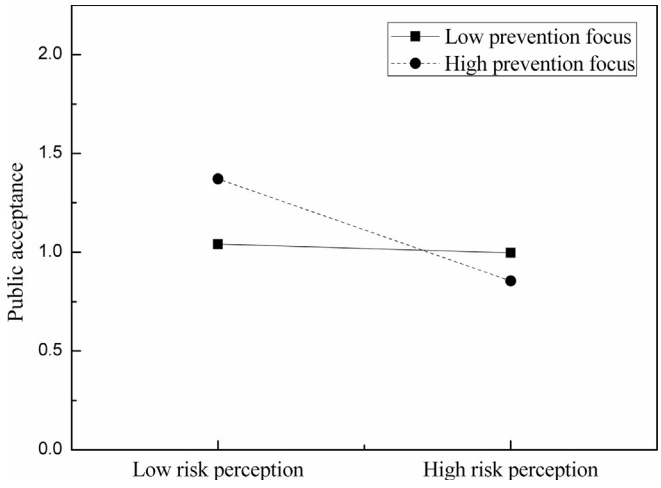


**Fig. 2.** Plot of interaction between risk perception and prevention focus on PANE.

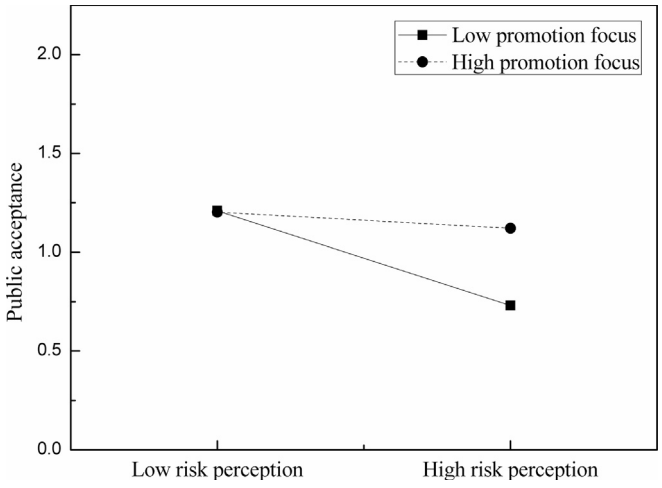


**Fig. 3.** Plot of interaction between risk perception and promotion focus on PANE.

PANE when promotion focus was low rather than high. Furthermore, Fig. 4 showed that benefit perception was more positively related to PANE when promotion focus was low rather than high. Hence, the results showed that promotion focus weakened the negative association between risk perception and PANE, while prevention focus strengthened the negative association between risk perception and PANE. Promotion focus weakened the positive association between benefit perception and PANE, whereas prevention focus had no significant moderating effect on the positive association between benefit perception and PANE.

### 4.3. Moderated mediation effect

Moderated mediation effect was examined by bootstrapping. As shown in Table 5, an indirect effect of trust in government on PANE via risk perception was significant when prevention focus was high ($\beta = 0.08$, $p < 0.001$), whereas for low-prevention focus, the indirect relationship was not significant ($\beta = 0.00$, ns). In addition, the difference between the above two coefficients was significant ($\Delta\beta = 0.08$, $p < 0.001$). Therefore, prevention focus moderated the mediation of risk perception between trust in government and PANE, in other words the mediating effect was stronger when prevention focus was high rather than low. On the contrary, the difference of the indirect effect of trust in government on PANE via benefit perception was not significant ($\Delta\beta = -0.03$, ns). Therefore, prevention focus had no significant moderating effect on the mediation of benefit perception between trust in government and PANE.

Table 5 also indicated that the indirect effect of trust in government on PANE via risk perception was significant when promotion focus was high ($\beta = 0.04$, $p < 0.01$), whereas for low promotion focus, the indirect relationship was not significant ($\beta = -0.02$, ns). In addition, the difference between the above two coefficients was significant ($\Delta\beta = 0.06$, $p < 0.001$). Therefore, promotion focus moderated the mediation of risk perception between trust in government and PANE, in other words the mediating effect was stronger when promotion focus was high rather than low. On the contrary, the difference of the indirect effect of trust in government on PANE via benefit perception was not significant ($\Delta\beta = -0.06$, ns). Therefore, promotion focus had no significant

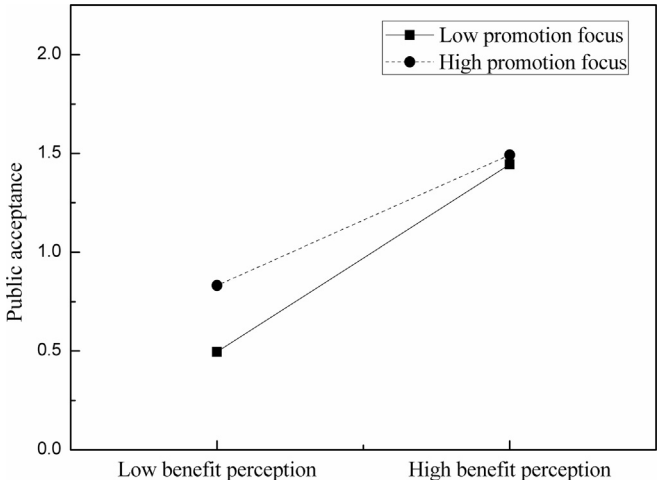


**Fig. 4.** Plot of interaction between benefit perception and promotion focus on PANE.

moderating effect on the mediation of benefit perception between trust in government and PANE.

### 4.4. Discussions

This study summarized that risk perception and benefit perception had a mediating effect on the relationship between trust in government and PANE, and trust in government influenced PANE indirectly through risk and benefit perception. This was consistent with the previous research [7,9,11,13,50,54].

Furthermore, the relationship between risk perception and PANE was moderated by regulatory focus. As we expected, the negative relationship between risk perception and PANE became stronger when individuals had high prevention focus. The negative relationship between risk perception and PANE became weaker when individuals had high promotion focus. Individuals with high prevention focus were vulnerable to the nuclear accidents (such as the Fukushima Daiichi accident) and tended to be cautious when faced with the risk of nuclear energy. In contrast, individuals with high promotion focus were encouraged by successful cases or experts (such as nuclear scientists and engineers) who had a positive attitude towards change, and were willing to take risk. However, prevention focus had no significant moderating effect on the relationship between benefit perception and PANE. That might be explained by that individuals with prevention focus only sought non-losses and tried to avoid losses rather than seek gains [55].

Beyond our expectation the results also demonstrated that promotion focus could not strengthen the linkage between benefit perception and PANE. This might be explained that benefits of nuclear energy including mitigating climate change, reducing electricity prices, and providing safe and long-term energy, were shared by the whole society. Although individuals with high promotion focus were sensitive to attain benefits, they did not deem these benefits as belonging only to themselves. For individuals with high promotion focus, they only cared about how many benefits they would get alone. Therefore, the benefits of nuclear energy shared by the whole society would not be enough to stimulate the individuals with high promotion focus. Although promotion focus weakened the relationship between benefit perception and PANE, it did not subvert the positive relationship between benefit perception and PANE. As shown in Fig. 4, for individuals with high promotion focus, their acceptance was higher.

The study also demonstrated that regulatory focus could moderate the mediation of risk perception, such that mediated relationships would be greater under high levels of prevention/promotion focus than under low levels. On the contrary, regulatory focus had no significant moderating effect on the mediation of benefit perception.

## 5. Conclusions and policy implications

The present study analyzed the moderating effect of regulatory focus with Regulatory Focus Theory on PANE, and it was proposed to explain the public's motivation for making decision and a wide range of processes from motivation through to complex cognition and ensuing behavior. Since few researches had concentrated on the moderating effect in PANE, our study contributed to the literature by extending and testing a moderated mediation model through the inclusion of regulatory focus as a moderator of the relationship between risk/benefit perception and PANE. Our study also confirmed that enhancing the public's trust in government could further strengthened PANE. Benefit perception and risk perception had significant mediating effects between trust in government and PANE. Regulatory focus (representative of individual differences and personality traits) was confirmed to moderate not only the relationships between risk/benefit perception and PANE, but also the mediation of risk perception on the relationship between trust in government and PANE. Therefore this research deepened our understanding of PANE and extended the application of RFT.

Based on the above-mentioned findings, following implications could be proposed:

1) Government should place more emphases on the public's trust in government and increase public participation in the decision-

**Table 5**
Results of the moderated path analysis (N = 971).

| Moderator variable | Trust in government (X) → Risk perception (M1) → PANE (Y) | | | | | Trust in government (X) → Benefit perception (M2) → PANE (Y) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Stage | | Effect | | | Stage | | Effect | | |
| | First | Second | Direct effects | Indirect effects | Total effects | First | Second | Direct effects | Indirect effects | Total effects |
| | Pmx | Pym | Pyx | PymPmx | Pyx + PymPmx | Pmx | Pym | Pyx | PymPmx | Pyx + PymPmx |
| Low Prevfocus | 0.18** | −0.03 | 0.50*** | 0.00 | 0.50*** | 0.40*** | 0.41*** | 0.35*** | 0.17*** | 0.52*** |
| High Prevfocus | −0.34*** | −0.23*** | 0.44*** | 0.08*** | 0.51*** | 0.34*** | 0.41*** | 0.33*** | 0.14*** | 0.47*** |
| Difference | −0.51*** | −0.21* | −0.07 | 0.08*** | 0.01 | −0.07 | 0.00 | −0.02 | −0.03 | −0.05 |
| Low Promfocus | 0.14** | −0.12 | 0.53*** | −0.02 | 0.51*** | 0.38*** | 0.48*** | 0.30*** | 0.18*** | 0.48*** |
| High Promfocus | −0.30*** | −0.14** | 0.43*** | 0.04** | 0.48*** | 0.36*** | 0.34*** | 0.36*** | 0.12*** | 0.49*** |
| Difference | −0.44*** | −0.02 | −0.09 | 0.06*** | −0.03 | −0.02 | −0.14 | 0.07 | −0.06 | 0.01 |

Notes.
a) *p < 0.05, **p < 0.01, ***p < 0.001.
b) PANE, public acceptance of nuclear energy; PrevFocus, prevention focus; PromFocus, promotion focus.

making. Trust in government significantly affected PANE as concluded from this study. It was a challenge to make government more trustworthy in the public administration. Undoubtedly making the decision-making more transparent could increase trust in government. Therefore, government should publish relevant information about nuclear safety periodically and timely on Internet or through other means. Government should increase public participation, for example public hearings and auditing, in the decision-making of nuclear facilities.

2) Government should promote the benefits of nuclear energy and strengthen the science popularization of nuclear energy. Our result indicated benefit perception was positively associated with PANE, whereas risk perception was negatively associated with PANE. It was important to increase the public's benefit perception and decrease the public's risk perception in order to improve PANE. First, government should emphasize the key benefits of nuclear energy to the public especially sustainable supply and climate change mitigation. China faced the issues of energy shortage and environmental pollution such as haze [56]. As one kind of clean and sustainable energy, nuclear energy was a necessary strategic option for China [57]. Secondly, government should strengthen the science popularization to decrease risk perception in order to avoid the public's prejudice and misunderstanding about nuclear energy.
3) Government should adapt different allocation strategies of benefit according to the different proximity to nuclear facilities. Government should promote the benefits such as climate change mitigation and long-term sustainable energy to those people living far away from the nuclear facilities. But to those people living near the nuclear facilities, government should issue more specific benefit allocation policy (e.g., offering job opportunities, local heating, extra subsidy to the inhabitants, etc.). It could make them clearly feel these benefits were exclusive for themselves.

But some limitations should also be admitted and concerned on in our study. Firstly, longitudinal study could be carried out to explore the change of individual's regulatory focus with time in ensuing work. Secondly, the sampling methods could also be diversified, for example combining the online survey and face-to face survey together in the future.

## Conflicts of interest

The authors have no conflicts of interest to declare.

## Acknowledgements

The authors wish to thank other FDS Team members. The work was supported by National Magnetic Confinement Fusion Science Program of China (Grant No. 2015GB116000), Informatization Project of Chinese Academy of Sciences (XXH13506-104), National Natural Science Foundation of China (71671179), Anhui Provincial Special Project for High Technology Industry, Special Project of Youth Innovation Promotion Association of Chinese Academy of Sciences and Project of Nuclear and Radiation Safety Supervision of National Nuclear Safety Administration (JD201842/JD201929).

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