



The Influence of Social Emotion Representation Framework on Residents' Water-Saving Education Project

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Abstract. Citizen's usage of water is one of important parts of urban water utilization. The problem of water shortage has been affecting the urban development in lots of regions for a long time. Therefore, it is very necessary to understand the public's attitudes and behaviors towards water saving and to explore reasonable and effective ways of water-saving education project. In this study, 490 Beijing residents were selected to investigate the impact of framing message and social emotions on public attitudes towards water saving through situational experiments. The results showed that social emotion had significant influence on public water-saving attitudes and behaviors, but frame information had no significant influence. These findings provide some theoretical support for future water-saving education project. In addition, based on the above results, this study puts forward some educational suggestions from two aspects of teaching content design and media selection.

Keywords: social emotion · framing effect · water-saving education

1 Introduction

Environmental protection, as a popular topic in the world, has been valued and advocated by lots of people. Five of seventeen Sustainable Development Goals (SDGs) set by the United Nations are related to environmental protection. Among them, what related to water resources is the cleanliness and sanitation of drinking water. About 1.7 billion people worldwide have already had access to safe drinking water since 1990, but 884 million people still do not have access to safe drinking water. As a large country lacking water resources, promoting water conservation has become a very strategic and important primary goal. From the perspective of the state and relevant government departments, it is very important to effectively promote citizens' awareness and behavior of water conservation through corresponding policies or education. According to the 2004 China Water Resources Bulletin, 110 of China's 669 cities have serious water shortage problems. Beijing is one of the most water scarcity cities in China, with up to 80% of resident's

water usage in total amount of city water usage. Therefore, how to promote Beijing residents to save water has become a very critical and urgent problem that restricts the development of Beijing.

Water-saving generally means to maximize the potential of water resources, implement a series of effective methods and measures, make rational use of water resources and optimize the utilization efficiency of water resources [1]. Water-saving attitude is defined as a general attitude towards water resources, which is highly concerning about water resources, supporting activities to protect water resources, and criticizing actions that cause water pollution. Many studies have shown that water-saving attitudes and behaviors are influenced by many factors, such as drought or water-saving consciousness [2, 3], values, and the general attitude toward water resources and social information [4], education factors [5], etc. As one of the important factors shaping individuals' consciousness and behavior, the importance of education can not be ignored in the field of water conservation. At present, even though the water saving education has various contents and methods, huge differences in their efficiency still exist. In actual practices, some researchers have explored how to improve the influences of education from optimizing medium selection, target audience, teaching ideas and teaching evaluation based on the theory of information communication [6]. For the educated, there is still a gap between their attitude and behavior. So to put their attitude into actual behaviors, it is necessary to intensify and improve their emotional attitude and values toward environment. Under this circumstance, it is essential for the emotional education to put the improvement of emotional attitude and values as their top objective, and focus on exploring the attitude of different individuals. Apparently, focusing on different kinds of emotions has already become the orientation of deepen the emotional education researches [7], and considering this, the current study aims to examine how to choose proper education methods for specific individuals based on psychological theories.

Currently, emotion has been widely used in the field of environmental protection and play a crucial role in pro-environmental behavior [8], but social emotion has only received little attention. As one of the typical pro-environment behaviors, the social emotion seems to provide a new perspective to explain how does water-saving publicity affects water-saving attitudes and behaviors. In recent decades, social emotion has attracted an increasingly of attention from both psychology and sociology researchers [9, 10]. The emotion that contains common psychological intention externalized from personal emotion after social generalization has been known as social emotion. It divides into two categories, basic emotions and composite, and the former include both positive and negative emotions, and then the latter is a mixture of a series of basic emotions [11] that have effects on certain behaviors under specific circumstances [12]. Therefore, this study divides social emotions into positive and negative, with the former referring to positive emotions and the latter to negative emotions. Based on the above researches, the following hypothesis is proposed: H1-A: Under different social emotions, individuals have significant differences in water-saving attitudes and behaviors.

In addition to inducing individual emotions, the expression of education may also play a role in promoting pro-environment behaviors [13]. Among them, the phenomenon of using different expressions for the same problem to cause different preferences of individuals is called framing effect [14, 15]. With the deepening of the study, researchers

found that different frameworks do not simply affect people's behavioral decisions, but are constrained by individual and situational factors [16–18]. Kahneman and Tversky's research proves that emotions are closely related to framing effect. They believe that subjects will generate positive emotions under the positive framework, and under the negative framework, the negative emotions will be generated as well, which will affect the decision-making results. Therefore, based on these researches, the following hypothesis is proposed: H2-A: Under different frameworks, there are significant differences in individual's water-saving attitudes and behaviors; H3-A: There is an interaction between social emotion and frame information on the influence of individual water-saving attitudes and behaviors.

2 Material and Methods

2.1 Participants

A total of 490 residents of districts in Beijing participated in this experiment (41% male, 59% female). In terms of education, 71% have a bachelor's degree, 15% have a master's degree or higher, 10% have a high school degree and 4% have a junior high school degree. In terms of regional distribution, Haidian District had the largest population distribution, accounting for 32%, followed by Chaoyang District, accounting for 13%, and a small number of subjects were distributed in other districts and countries.

2.2 Procedure

The subjects were told that they needed to read the material and watch several pictures, and then they would complete a questionnaire. 490 subjects were randomly assigned to a 2 (emotion: positive, negative) \times 2 (frame: positive, negative) between-subjects experimental design. We manipulated the social emotions by presenting pictures of positive and negative emotions respectively, and selecting some water-saving techniques in daily life as frame messages to present it in both positive and negative ways. For example, 1. Turning off the shower when didn't use it. 2. Installing water-saving toilet that contain two buttons to control the water volume at home, or putting a water container like a bucket near the toilet to save water. 3. Washing clothes after it meets the maximum load of the washing machine, and hand-washing small items. 4. Preparing a container to collect used water at home for water reusing. 5. Washing dishes in a container rather than rinsing them straight at the tap. The positive and negative expressions are equal in the objective result, but in a different frame.

2.3 Materials

The frame message of water-saving techniques used in this study is a self-compiled water-saving situation material, and the pictures of social emotions are all from local people's real life. Based on the water resource Concern Scale [19] developed by Watkins and Alfred, this study compiled the residents' water-saving attitudes and behaviors scale to evaluate residents' water-saving attitudes and behaviors. For example, the answers for the question "Do you know the current price of water?" were ranging from 1 (not know at all) to 5 (completely know).

Table 1. Descriptive statistical results of the influence of social emotion and frame messages on water-saving attitude and behavior

| social emotion | Water saving framework | <i>N</i> | <i>M</i> | <i>SD</i> |
|----------------|------------------------|----------|----------|-----------|
| Positive | positive | 133 | 3.99 | 0.50 |
| | negative | 112 | 4.02 | 0.51 |
| Negative | positive | 122 | 4.26 | 0.50 |
| | negative | 123 | 4.15 | 0.46 |

3 Results

To explore the influence of social emotion and frame messages on residents' water-saving attitudes and behaviors, descriptive statistics were conducted on the water-saving attitudes and behaviors of the subjects under different experimental conditions. The results were presented in Table 1. Taking water-saving attitudes and behaviors as dependent variables, 2×2 variance analysis was carried out, and the results showed that the main effect of social emotion was significant [$F(1, 488) = 19.70, p < 0.001, \eta^2 = 0.04$]. Subjects with negative emotions ($M = 4.20, SD = 0.48$) scored higher in water-saving attitudes and behaviors than subjects with positive emotions ($M = 4.00, SD = 0.50$). The main effect of frame messages [$F(1, 488) = 0.91, p > 0.05, \eta^2 = 0.002$] and the interaction between social emotions and frame messages on water-saving attitudes and behaviors were not significant [$F(1, 486) = 2.42, p > 0.05, \eta^2 = 0.005$].

4 Discussion

Based on the theories of framing effect and social emotion, present research discussed the impact of frame messages on public attitudes and behaviors towards water conservation through situational experiments. The main conclusions include:

- Social emotion has a significant effect on the public's attitude and behavior towards water conservation, and the subjects got a higher score on water conservation attitude and behavior under the condition of negative emotion. When people see negative emotional pictures, they will produce negative emotional experience, which will make them be more pessimistic and worry about the water scarcity, and then improve their attitude and behavior of water conservation.
- Frame messages has no influence on public attitudes and behaviors towards water conservation, which means, whether the water-saving skills are transmitted to the subjects through positive or negative frame message, people's attitudes and behaviors towards water conservation will not be affected.
- The interaction effect between social emotion and frame messages on water-saving attitude and behavior is not significant.

Based on the findings of this study, educators can conduct practical education and teaching activities more flexibly and effectively. We provide educational advices from two aspects: educational content design and media selection.

The teaching content includes teaching material and teaching purpose. For example, in teaching materials, educators can present the overall water scarcity situation to students through the accurate data and related objective materials. Since the results of this study show that framing effect has no influence on water-saving attitude and behavior, the audiences' attitude and behavior will not be affected, no matter how to present the data of the water situation, in a positive or a negative way. Secondly, after presenting the overall situation, educators can use some related pictures to describe the water-shortage situation of local and surrounding areas to students to help them build connection with populations living in those areas. Finally, students can be introduced to several ways of saving water in daily life by participating classroom activities or visiting professional water-saving institutions like water-recycling factories. The teaching objectives also should match the teaching materials and work together to cause the best effect. According to the examples above, teaching objectives include understanding the overall situation of water resources in China, realizing the harm caused by water shortage to human life, and mastering water-saving skills and practicing them in life. For students, water conservation education not only enables them to understand the situation of water resources in China and the surrounding areas, but also cultivates their emotional attitude and values towards water conservation.

In order to further improve the quality and the effect of education, only designing proper teaching contents is not enough, choosing the suitable teaching methods like teaching medium is also important. In China, the mediums of classroom teaching are mainly textbooks and academic slides, etc., and with the development of the internet, remote teaching such as online courses are also gradually emerging. Our study found that images that convey negative emotions have a greater impact on people's attitudes and behaviors toward water conservation than images that convey positive emotions. Compared with text and traditional PPT, pictures and videos are more likely to arouse people's emotional response. By this studying, we believe that both traditional and modern classrooms can introduce the necessity of water saving to students in the form of pictures and videos. Besides, in water-saving teaching, it is worth paying attention to the negative emotional feelings, which usually contain positive values and positive meanings [7]. Therefore, in the actual teaching, educators should combine the use of multiple media, value students' emotional education in water conservation, and develop students audibly and visually to achieve the purpose of emotional attitudes and values.

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