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Challenging Ingrained Thoughts? The Joint Effect of Stereotypes and Awareness of Related Information on Pro-Environmental Behavior in China

Majid Ghorbani [ID] **and Liyan Xuan** *

School of Business, Renmin University of China, Beijing 100872, China; majidghorbani@rmbs.ruc.edu.cn
* Correspondence: xuanliyan@ruc.edu.cn; Tel.: +86-151-2205-9973

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Abstract: This research applies a positive stereotype perspective to test the effect of individuals' choices between pro-environmental versus pro-safety behavior, while considering the role of media exposure. We test our hypotheses in China, where both food-safety and environment are major issues and are widely covered by the media and government reports. Based on a quasi-experiments and survey questionnaires focused on attitudes towards disposable chopsticks, we find that individuals form cognitive perceptions in ways that either have stronger positive environmental or safety stereotypes. Based on these stereotypes, they either believe that reusable chopsticks are more environmentally friendly or that disposable chopsticks are safer, each impacting individuals' choices differently. In addition, awareness of information related to the environment augments the link between environmental stereotypes and pro-environmental behavior, while having no influence on the effect of safety stereotypes on pro-safety behavior. On the other hand, while awareness of safety-related information accentuates the link between safety-related stereotypes and pro-safety behavior, it has no impact on the effect of environmental stereotypes on pro-environmental behavior.

Keywords: positive stereotype; pro-environmental behavior; awareness; safety and environmental concerns; China

1. Introduction

Scholars [1–3] have been using the theory of planned behavior to investigate people's environmental behavior. The theory of planned behavior [4] posits that attitudes toward behavior, subjective norms, as well as perceived behavioral controls, together shape an individual's behavioral intention, and in turn influence an individual's behavior. However, existing knowledge of theoretical explanations of pro-environmental behavior (PEB) remains incomplete. We still need to better understand the reasons for individuals' environmentally unfriendly behavior to be able to develop solutions to change it globally. Drawing on the concept of stereotypes [5], the present research specifically looks at and explores this new rationale for inveterate environmentally unfriendly behavior. Specifically, we integrate and extend the environmental literature by using positive stereotyping in the environmental cognition literature to examine the predictive effect of stereotypical cognition of environment and safety on behavior, and probe deeper into the influence of awareness (of environmental and safety issues) on behavior.

Different disciplines suggest a variety of antecedents for pro-environmental behavior. For instance, environmental sociologists and environmental psychologists at the individual level examine individuals' demographic antecedents, such as age, gender, and income [6–8], and from a psychological and sociological perspective, such as individuals' social status, attitudes, and intentions, as well as social norms and culture [9–12], or even stores' signaling [13]. In evaluating the pro-environmental

behavior of individuals, we take an environmental cognition perspective [14], which indicates that cognition serves as the most significant predictor of behavior.

We position ourselves in the environmental cognition literature by focusing on the limitations and barriers of cognition [15] and define environmental cognition as the stereotypical knowledge of the impact of peoples' decisions and actions on the environment. Stereotypical knowledge is the oversimplification of information and characteristics of a person or a group [5], which is also extended to mean simplifying and codifying information about people or objects [16] and could be positive or negative [17]. Individuals use this codified positive or negative stereotypical knowledge of objects and based on it make subconscious decisions or judgments about these objects [18]. However, there is a very small number of studies [19] exploring the role of stereotyping in the fields of environment and safety work.

Apart from cognitive barriers, knowledge and awareness are also important parts of environmental cognition [15]. The salient role that mass media and news play in peoples' environmental participation has been long recognized [20]. Governments use the media to communicate their environmental plans to the public and raise awareness. In this study, we also take a cognitive approach toward this construct and suggest that awareness of environmental and safety issues could increase the effect of environmental cognition as manifested in positive or negative stereotypes.

We test our hypotheses in the context of China, where people are engulfed in two types of somewhat related issues: environment and food safety. The first one is related to environmental pollution such as air or land pollution that is a direct result of human activity and consumption. The latter is a struggle for safety, to protect people from unhygienic items related to food and beverages, as well as food containers and eating utensils. We suggest that people have formed oversimplified and stereotypical ideas about both issues, which automatically impact their consumption behavior. In this study, we test these effects fully in a Chinese context–i.e., the choice of reusable or disposable chopsticks–together with exploring the contingent effect of being aware of news reporting on and policies promoting pro-environmental and pro-safety measures.

The context of China is very important and interesting in this sense. Since the first environmental protection conference in 1973, China has witnessed a large increase in the implementation of its pro-environmental projects. Nevertheless, the results seem unsatisfactory, regardless of the attitudes or behavior of people, firms and even government officials and policies [3]. Chiu and Tai [21] point to a NIMBY (not-in-my-backyard) mindset in China as the basis of this problem. The government uses schools, policies, and the media to raise people's awareness and change their behavior, but there is still major variation between genders and regions [8]. Therefore, various studies [3] suggest looking for the roots of this problem in individuals' psychological characteristics.

The safety of food and products are another major issue in China. Many street stalls and hole-in-the-wall restaurants are said to use gutter oil, an illegal black-market oil that is produced by recycling oil and animal fat disposed of in the garbage and in sewers [22]. Radio Free Asia [23] estimates that about ten percent of such restaurants use gutter oil. Cases of baby formula containing melamine, meat of a questionable type, in addition to unhygienic restaurants and chopsticks have been major concerns in China for decades. China's 2009 food safety laws have created strict rules and punishments for violators. However, a recent news article in the South China Morning Post [24] reports that, in 2017, there were still many cases of production and sale of gutter oil, as well as other food safety issues such as the inclusion of opioids in chili oil being tried in courts in various parts of China. This situation has created a different type of stereotypes among people about the lack of hygiene in many restaurants, such as the assumption that they are not diligent in cleaning their dishes and utensils. These stereotypes are not only about street food, which is more or less being banned in larger cities, and hole-in-the-walls, but also about average restaurants. However, no one has ever really studied the effect of these stereotypes on people's behavior.

Chopsticks are perfect for gauging people's stereotypes towards safety and environmentalism because they are the most commonly used eating utensils that have environmental impacts as well as safety ones. From the environmental perspective, the 2011 China White Paper on Policy and Action for Climate Change [25], and the Circular on Carrying Out in a Deep Way of Reducing the Use of Disposable Chopsticks in Restaurants and Hotels [26] state the policy discourse of "reducing" or "not using" disposable chopsticks to reduce their impact on deforestation and waste. However, China's annual production and marketing volume of disposable chopsticks is still significantly higher than that of reusable ones. For example, from the total of US$12.04 million worth of chopsticks traded in the first eight months of 2017, about US$11.14 million or about 92.3% were classified as disposable wooden and bamboo chopsticks [27]. A recent report [24] suggests that 20 million disposable sets of take-out food utensils are used daily, many of which end up in landfills due to the lack of appropriate recycling procedures and standards.

Most people ignore the impact of daily reusable or disposable items, even though they could have significant impact on safety and the environment. We suggest, due to their constant use, individuals form their own simplified positive or negative stereotypes about the two kinds of chopsticks and choose to use one or the other based on stereotypes. On the one hand, people form the stereotype that by choosing "cleaner" disposable chopsticks they no longer need to be worried about whether the restaurants have done their due diligence in cleaning reusable eating utensils. In this way, disposable chopsticks eliminate peoples' concerns about the safety and cleanliness of reusable chopsticks. On the other hand, these disposable utensils add to the amount of waste, and in the case of chopsticks, result in increases in the cutting of trees and deforestation, hence forming an environmentally unfriendly stereotype in the minds of people. Therefore, this latter type of people would be more likely to use reusable chopsticks. The current study, therefore, aims to compare the effect of individuals' stereotypical cognition of environmental protection and safety based on their choice of either type of chopsticks.

Research into the role of awareness in the China context is particularly important. The Chinese government through policy and regulatory institutions has put considerable effort into raising awareness [28], but research [29] finds that the effectiveness of these policies depends, among other issues, on the general public's awareness. While prior studies look at the effect of media exposure on pro-environmental behavior as related to the effectiveness of policies, we suggest that awareness of information congruent with individuals' stereotypical cognition is a complementary factor to individuals' environmental and safety cognition and we investigate its effect on the relationship between each type of stereotyping and pro-environmental and pro-safety behavior.

1.1. Definition and Types of Stereotype

Stereotypes have traditionally been conceptualized as the association of beliefs about characteristics, attributes, and behaviors of members of a group [5]. Lippman points out that reality is too complicated for individuals to remember and interpret all presented information precisely. Therefore, stereotypes have long been recognized as an "energy-saving device" by social psychologists to simplify information processing and accelerate decision making [30–32]. As one of the most fundamental psychological processes, stereotyping is ubiquitous with multiple justifications. One explanation lies in cognitive economy, which argues that individuals' cognitive resources are finite, while everyday information is infinite [33]. Individuals must adopt an economical and practical approach to allocate these finite cognitive resources and the application of stereotypes is a viable choice, being energy-saving. Another reason for stereotyping is the lack of ability or motivation to think or explore more deeply [34,35]. When individuals deem it unnecessary or are unable to pay more attention to individuating information, stereotyping is likely to be activated. Moreover, individuals who stereotype are labeled as cognitive misers; everyone is lazy when it comes to cognitive activities [36]. In sum, what cannot be denied is that stereotyping is common in human cognitive processes.

Abundant prior research probes deeply into the application of positive and negative stereotypes to people. For instance, shoving performed by a black person is viewed more negatively and as more violent than if performed by a white person [37]. In a similar vein, any aggressive behavior from a man is seen as more hostile than if it comes from a woman [38]. Moreover, common positive stereotypes of women include typical information about physical characteristics (e.g., long hair, petite figure), personality traits (e.g., docile, dependent), and expected occupation (e.g., nurse, clerk) [39]. Thus, a male nurse or a fierce woman will be regarded as unusual or sometimes even forbidden. Similar positive and negative examples are too numerous to count.

1.2. Stereotypes and Pro-Environmental Behavior

It is reasonable to infer that individuals do not only hold stereotypes toward groups of people, but also toward things such as environment and safety issues and by extension to instruments and utensils (e.g., reusable chopsticks and disposable chopsticks). Even when shopping for things such as environmentally friendly products, consumers often engage in automatic behavior that is based on their existing cognition [13]. Lee and colleagues [19] also find that, though all positive in nature, some corporate social responsibility activities of firms are stereotypically perceived more positively (negatively) by consumers. In a study of household waste management, Barr [40] investigates the reasons people reduced, reused, or recycled their waste and concluded that environmental value, knowledge, and concern predicted reduce and reuse behavior, while the recycling was based on highly normative and stereotypical behavior. Recycling behavior was a socially learned stereotype that most people performed automatically.

When applied to the context of chopsticks, we argue that decades of policy publicity in China appealing for the reduction in the use of disposable chopsticks and highlighting their impact on the environment (e.g., increasing waste in landfills and cutting of trees to produce them) has formed the stereotype in consumers that reusable chopsticks are more environmentally friendly. To some extent, these policies have remained ineffective due to the impact of other sets of events related to the safety concerns of reusable chopsticks such as lack of sterilization and incomplete cleaning. Such unfortunate events are likely to stimulate the spontaneous emergence of safety-related stereotypes in some individuals that disposable chopsticks are safer and cleaner than reusable ones. Considering the above, we propose that individuals can form one of the two competing positive stereotypes:

Hypothesis 1 (H1). *There is a stereotype among the public that reusable chopsticks are more environmentally friendly.*

Hypothesis 2 (H2). *There is a stereotype among the public that disposable chopsticks are safer.*

With strong cognitive functions such as simplifying information processing subconsciously, stereotyping to some extent can be viewed as having implicit cognition toward certain things. Support can be found in earlier works. For instance, Hamilton and Trolier [41] conceptualize stereotyping as "a cognitive structure that contains the perceiver's knowledge, beliefs, and expectancy about some human groups". Furthermore, in their review, Greenwald and Banaji [42] state that stereotyping involves implicit social cognition that is not introspectively unidentified by the actor and contains traces of past experiences that can influence judgments. Drawing upon social cognitive theory, an individual's behavior, cognition, and the external environment influence each other bidirectionally [43]. In this triadic reciprocal determinism, individual behavior is not only determined by external environment, but also by personal cognition. Therefore, stereotyping, as implicit social cognition, should have the capability to affect the behavior of a focal individual without their realization.

Specifically, those who hold the stereotype that reusable chopsticks are more environmentally friendly perform behaviors congruent with their own inner cognition and thus perform pro-environmental behavior and choose reusable chopsticks when both types of chopsticks are equally available. In contrast, individuals who stereotypically think restaurant safety is an issue are more likely to trigger the stereotype that disposable chopsticks are safer. This latter type of individual is more likely to automatically choose disposable chopsticks over reusable chopsticks when both types are equally available to them. Such stereotype-based actions do not process any current or new information but are automatically performed using ingrained codified cues stored in one's mind from the past. Considering the above, we propose that the former type of stereotype leads individuals to pro-environmental behavior (PEB), while the latter stereotype diverts individuals from PEB:

Hypothesis 3 (H3). *The stereotype that reusable chopsticks are more environmentally friendly is positively related to PEB, i.e., preferring reusable chopsticks over disposable ones.*

Hypothesis 4 (H4). *The stereotype that disposable chopsticks are safer is negatively related to PEB, i.e., preferring disposable chopsticks over reusable ones.*

It is noteworthy that possibly some people may hold these two types of stereotyping simultaneously, resulting in wavering behaviors which deserve more complex explanations. Thus, this population is excluded in the present research. For those who continuously perform PEB or continuously do not perform PEB, we assume that they possess one stereotype only, or one stereotype is more prominent than the other and thus dominates behavior. However, we leave this for future studies to explore.

1.3. The Contingent Effects of Information Awareness

Expectancy-consistent information is more preferentially encoded and integrated in memory in that it is easier to interpret and assimilate with the existing knowledge structure than expectancy-inconsistent information [44]. The congruency bias has received much empirical support especially when it comes to stereotype-related information, such that individuals are inclined to selectively pay attention to stereotype-consistent information and abandon inconsistent information, thus further strengthening existing stereotypes [45,46].

Research shows that peoples' stereotyping is related to their choices of information sources in the way that people mostly seek or accept the information that is aligned with and supportive of their cognition and stereotypes. Indeed, Stroud [47] provides evidence that in the 2004 US elections, people chose media based on their political disposition. Iyengar's and Hahn's [48] findings from studying the perceived political affinity of news organization also reveal that people positively stereotype in support of the media that are perceived to be congruent with their political ideology and negatively against the media that are perceived to be incongruent with their political ideology. In detail, they investigate the political ideology of people and their media of choice and find that Republicans are more likely to watch Fox News, while actively avoid liberal types of news media; on the other hand, people who identify themselves as Democrats are more likely to watch CNN and refrain from consuming conservative types of news media [48].

When applied to the present research context, this logic provides a simple explanation as to why awareness exerts different effects on environmentalism and safety stereotypes and their link to subsequent choices of chopsticks.

Therefore, we suggest that when people are aware of the type of information congruent with their positive or negative stereotypes, their behavior is more likely to be affected by this information and not affected if otherwise. In detail, we propose that when people hold the stereotype that reusable chopsticks are more environmentally friendly, they are more likely to being influenced by the news and information about the environment that are congruent with their structured memory.

This type of information is more preferentially encoded and noticed, and hence strengthens their existing stereotypes, which in turn facilitates these individuals' pro-environmental behavior manifested in choosing reusable chopsticks. Under such circumstances, news and information about safety become inconsistent with their structured memory, which are likely to be neglected and, thus, have no influence on their cognition and behavior. In contrast, when people hold stereotypes that disposable chopsticks are safer, news and information about food safety are congruent with their structured memory and are more preferentially encoded and noticed; hence, their safety stereotypes are strengthened, which in turn promotes their choice of disposable chopsticks. Considering the above, we propose that:

Hypothesis 5a (H5a). *Awareness of environment-related information moderates the positive relationship between the stereotype that reusable chopsticks are more environmentally friendly and pro-environmental behavior such that the positive relationship is stronger when the awareness of environmental information is greater.*

Hypothesis 5b (H5b). *Awareness of environment-related information has no moderating effect on the negative relationship between the stereotype that disposable chopsticks are safer and pro-environmental behavior.*

Hypothesis 6a (H6a). *Awareness of safety-related information moderates the negative relationship between the stereotype that disposable chopsticks are safer and pro-environmental behavior such that the negative relationship is stronger when the awareness of safety-related information is greater.*

Hypothesis 6b (H6b). *Awareness of safety-related information has no moderating effect on the positive relationship between the stereotype that reusable chopsticks are more environmentally friendly and pro-environmental behavior.*

The above hypotheses are summarized into Figure 1, which depicts the theoretical framework proposed in the present research.
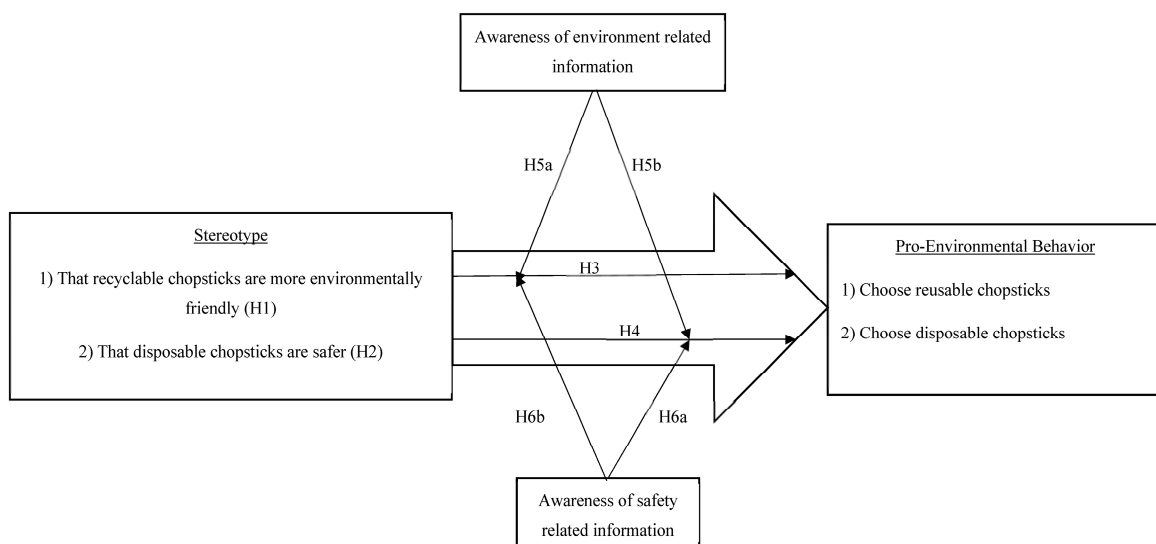

Figure 1. Research model.

2. Materials and Methods

2.1. Sample and Data Collection

The present research aims to explore the link and its boundary conditions between individuals' stereotypes about reusable and disposable chopsticks, and their pro-environmental behavior. The research context is the choice between one of the two types of chopsticks, when both reusable and disposable ones are equally available. To test the hypotheses, a quasi-experiment together with a field survey questionnaire was conducted in 2014, in Beijing, China. We chose the area near the Beijing railway station, which is frequented by people from all over China and has a high concentration of small and hole-in-the-wall restaurants. Hole-in-the-wall restaurants are often family run restaurants that offer home (or regional) cooking. Hole-in-the-wall restaurants are cheap and down-market and are known for not being fancy or clean. They are often located in places with heavy foot-traffic, such as around train stations, bus terminals, shopping areas, and residential neighborhoods. This ensured that the possibility of concern for safety is potentially present.

Our graduate students were trained to perform the experiment and collect data. The restaurant owners were informed about the experiment to obtain their consent to collect data at their location. They were promised no interruption in their services or hassle to their customers. They were also told that the research team would bring the chopsticks and reward the clients for participation, which could be perceived as an advertisement for their restaurants.

All hole-in-the-wall restaurants where we conducted our study used wooden or bamboo reusable chopsticks for people who dine in. The reason, very likely, is that reusable chopsticks are more cost effective for them than disposable chopsticks. For example, wholesale reusable bamboo or wooden chopsticks, which are commonly used in hole-in-the-wall restaurants, sell for approximately RMB0.2 (At the time of writing of this study, May 2018, the average conversion rate was USD1= RMB6.37) to RMB0.5 per pair and thus are far cheaper than plastic, melamine, metal, or other reusable types of chopsticks. On the other hand, disposable wholesale bamboo or wooden chopsticks are priced at RMB0.02 to RMB0.08. Our target participants were customers who dined on site, where we could observe their behavior regarding the type of chopsticks they used. Despite being priced ten times higher, reusable chopsticks are preferred by this type of restaurants, because they outlast disposable chopsticks by even hundreds of times and the cost of cleaning them is very low. This is also a source of concern about hygiene at many hole-in-the-wall restaurants as whether the restaurant owners really spend enough money (e.g., material and labor) to clean and sanitize their chopsticks and dishes.

Researchers put the already prepared disposable chopsticks together with reusable chopsticks in the same container on all dining tables. The researchers then observed what type of chopsticks was chosen by customers upon the arrival of food. After the consumption of the meal and before leaving their seats, the customers were approached and asked to answer a short survey questionnaire in return for a small gift (e.g., good-quality wet towel, keychain, or pen). The researchers, upon the customer's agreement to participate in the study, would give him/her the survey on which the appropriate (i.e., reusable or disposable) chopsticks was already marked relatively discretely. This process was repeated at 8 restaurants during lunch and dinner time over the course of two days.

During these two days, 316 questionnaires were collected. Unfortunately, due to the speed of data collection, the graduate students could not keep track of the exact number of people who refused to take the survey. However, all investigators estimated the participation rate to be over 50% but less than 80%. During data cleaning, 99 surveys were discarded, and the remaining 217 samples were included in final analysis with an effective rate of 68.7%. The elimination of those 99 surveys was mainly due to two reasons. The first one was the obvious lack of seriousness in filling in the survey as determined by answering all or a long series of items with the same rating. The second reason was inconsistency in the choice of chopsticks, as observed in the experiment, and the participant's answer as to their usual choice. Specifically, in the questionnaire there was one item asking, "do you

often use this type of chopsticks?", which is rated on the scale of 1 to five ranging from "completely disagree = 1" to "completely agree = 5". Those who chose 1 or 2 for this item were excluded in our final sample, in that their conflicting observed and claimed pro-environmental behavior merited a more complicated explanation.

In sum, our final sample consists of 217 individuals with an average age of 30.35 years (SD = 7.655). Among them, 61 (28.11%) are female, 121 (55.76%) are married, 169 (77.88%) have a college degree or above, and 119 (54.84%) have a greater than 5000RMB monthly income. As we intended to capture a sample representative of China, participants are from 23 out of the total of 31 administrative areas (provinces and special administrative cities) of Mainland China. We did not find any significant difference between our final sample (*n* = 217) and the total sample (*n* = 316) in terms of demographic or administrative characteristics.

2.2. Measurement of Variables

Due to the specific context of China and chopsticks, we prepared our questionnaire by adapting the closest available scales. We first drafted the questionnaire in English and sent it to three China scholars whose research is in the relevant area of pro-environmental behavior. In addition to the suggestions received from these scholars, we also took into consideration various studies in similar fields [6–8,40,49] to develop our questionnaire. Since the survey instrument is supposed to be administrated in Chinese, all the items underwent a back-translation process [50]. The scales were first translated into Chinese by two independent translators. The final items used include:

Pro-environmental behavior (PEB). Pro-environmental behavior is measured as a dichotomous variable by investigators. Investigators marked the survey as disposable or reusable after observing which type of chopsticks was used by the participant before handing them the survey after their meal. Specifically, using reusable chopsticks is viewed as a kind of pro-environmental behavior (coded 1), and using disposable chopsticks is taken as a signal of pro-safety and not pro-environmental behavior (coded as 0).

Independent and moderating variables are measured through self-reported instruments as follows:

Environmental cognition toward reusable chopsticks. This variable is measured with a two-item scale. "Reusable chopsticks reduce the amount of waste". "Reusable chopsticks reduce the number of trees cut". These items are rated from 1 = "completely disagree" to 5 = "completely agree" (α = 0.86).

Safety cognition toward reusable chopsticks. This variable is measured with a three-item scale. "Reusable chopsticks are more hygienic." "Reusable chopsticks are clean". "Reusable chopsticks are safe". These items are rated from 1 = "completely disagree" to 5 = "completely agree" (α = 0.87).

Environmental cognition toward disposable chopsticks. This variable is measured with a two-item scale. "Disposable chopsticks reduce the amount of waste". "Disposable chopsticks reduce the number of trees cut". These items are rated from 1 = "completely disagree" to 5 = "completely agree" (α = 0.77).

Safety cognition toward disposable chopsticks. This variable is measured with a three-item scale. "Disposable chopsticks are more hygienic." "Disposable chopsticks are clean". "Disposable chopsticks are safe". These items are rated from 1 = "completely disagree" to 5 = "completely agree" (α = 0.87).

Awareness of environment-related information. This variable is measured with a four-item scale. "Are you aware of what the Kyoto Protocol is?"; "Are you aware or have you seen any advertisements about recycling?"; "Are you aware of any news about waste as a result of human consumption?"; "Are you aware or have you seen any ads about pollution in Beijing or other large cities?". These items are rated from 1 = "not aware", 2 = "have heard of some", 3 = "somewhat aware", 4 = "completely aware", to 5 = "always follow them" (α = 0.75).

Awareness of safety-related information. This variable is measured with a three-item scale. "Are you aware of any news about food safety issues in China?"; "Are you aware if China has

signed any international hygiene standard treaties?"; "Are you aware of the extent of the national government's expenditure to ensure food safety?". These items are rated from 1 = "not aware", 2 = "have heard of some", 3 = "somewhat aware", 4 = "completely aware", to 5 = "always follow them" ($\alpha = 0.70$).

Control variables. Control variables include self-reported and externally sourced variables. Following prior pro-environmental behavior research [6–8], we include control variables such as gender (male = 0), age (actual value), marital status (single = 0, married = 1), education (six dummies for basic, high-school, vocational, undergrad, masters, and PhD or higher), and income level (seven dummies) provided by participants.

In addition, we added two macro variables based on where the person lived the longest to gage economic development, which is said to impact pro-environmental behavior [50]. These include two variables of whether the province or city of residence is an eastern, western, or central province and the GDP of the administrative area where they lived the longest.

3. Results

To avoid respondents' social desirability in answering questions to please us, we took two measures to not give any signal whether we preferred one type of chopsticks over the other or even we cared what type of chopsticks they used. First, the place where the type of chopsticks used by the participant was somewhat less visible. The ticked box was located next to handwritten questionnaire number. In addition, the words "reusable" and "disposable" were in English only and in a very small size font. Considering the type of restaurant patrons, it is less likely that our participants would be able to understand English, but we did not test them for it and do not know whether they were able to read English or not. Second, items asking questions about chopsticks were framed using identical wording and repeated one after another. For example, a question asking if reusable chopsticks reduced the amount of garbage, were followed with the one that asked if disposable chopsticks reduced the amount of garbage. Therefore, we could only assume that participants did not try to answer questions with social desirability or at least could not guess our intentions to conform or comply.

3.1. Preliminary Analysis

The variables' descriptive statistics, reliabilities, and correlations are displayed in Table 1. None of the correlations are unusually high or a cause of concern. Cronbach alphas of compounded variables, which are all greater than 0.7 [51], are reported in brackets and in boldface font.

3.2. The Confirmation of Stereotypes

We first hypothesized that stereotypes of one kind or the other exist among people. Hypothesis 1 and 2 state that there are stereotypes held by the public that reusable chopsticks are more environmentally friendly and that disposable chopsticks are safer. The results of the paired-sample T test shown in Tables 2 and 3 provide support for these hypotheses. As can be seen in Table 2, the 91 individuals who chose and often or consistently choose reusable chopsticks score significantly higher (M = 1.177, $p < 0.01$) on environmental cognition toward reusable chopsticks compared to their score on safety cognition. On the other hand, as shown in Table 3, the 126 individuals who chose and often or consistently choose disposable chopsticks score significantly higher (M = 0.353, $p < 0.01$) on safety cognition toward disposable chopsticks as compared to their score of environmental cognition. Further, binary logistic regression using different methods such as enter, forward and backward all show that two variables, safety cognition toward reusable chopsticks and environmental cognition toward disposable chopsticks, are excluded in the model (results not presented), providing strong support for Hypotheses 1 and 2.

3.3. The Main Effect of Stereotypes on Pro-Environmental Behavior

We then tested the main effect of stereotypes on pro-environmental behavior (PEB), which is measured as choosing reusable chopsticks (1) versus disposable ones (0), using logistics regression. Results of this logistics regression are shown in Table 4. We first tested the effect of control variables. As can be seen in Model 1 of Table 4, none of the control variables show a significant effect on PEB. Hypothesis 3 proposes a positive link between the stereotype that reusable chopsticks are more environmentally friendly and PEB, which is manifested in the choice of reusable chopsticks. As shown in Model 2, the environmental cognition toward reusable chopsticks is positively related to PEB (i.e., choice of reusable chopsticks, $\gamma = 0.565$, $p < 0.001$), when controlling for general demographic variables, safety cognition toward disposable chopsticks and awareness of both safety and environment-related types of information. Thus, Hypothesis 3 is supported. Hypothesis 4 predicts a negative link between the stereotype that disposable chopsticks are safer and PEB. The results shown in Model 2 indicate that the safety cognition toward disposable chopsticks is negatively related to PEB (i.e., choosing disposable chopsticks, $\gamma = -0.498$, $p < 0.01$), providing support for Hypothesis 4.

Table 1. Descriptive statistics, reliabilities, and correlations among measures (*n* = 217).

Variables	Mean	SD	1	2	3	4	5	6	8	9	10	11	12	13
1. Gender	0.28	0.451												
2. Age	30.35	7.655	−0.120											
3. Marital Status	0.56	0.498	−0.062	0.569 **										
4. Education	3.29	1.038	−0.059	0.041	0.017									
5. Geographic location of the city lived in the longest [a]	1.56	0.709	0.167 *	−0.042	0.055	0.005								
6. GDP of administrative region lived in the longest	54,500	23,121	0.043	0.112	0.018	0.032	−0.499 **							
7. Income	1.71	0.985	−0.222 **	0.098	0.142 *	0.155 *	0.008	−0.038						
8. Environmental cognition toward reusable chopsticks	3.9101	1.1912	−0.065	−0.029	0.050	0.071	0.006	−0.001	**(0.86)**					
9. Safety cognition toward reusable chopsticks	2.8294	0.9711	−0.057	0.066	0.059	−0.012	0.073	0.048	0.459 **	**(0.87)**				
10. Environmental cognition toward disposable chopsticks	2.3265	1.1958	−0.049	−0.005	0.118	−0.101	−0.112	0.140 *	−0.027	−0.017	**(0.77)**			
11. Safety cognition toward disposable chopsticks	2.6557	0.9701	−0.132	−0.009	0.080	−0.147 *	−0.092	0.000	0.092	0.076	0.386 **	**(0.87)**		
12. Awareness of environment-related information	2.3156	0.7951	0.025	−0.011	0.065	0.133 *	−0.042	0.051	0.197 **	0.201 **	0.124	0.007	**(0.75)**	
13. Awareness of safety-related information	2.0261	0.8095	−0.003	0.001	0.134 *	0.179 **	−0.076	0.038	0.030	0.087	0.068	−0.004	0.728 **	**(0.70)**

[a] Geographic location is divided to eastern, western, and central cities; Reliabilities of the scales are boldfaced and noted in the diagonals. * *p* < 0.05; ** *p* < 0.01; two-tailed tests.

Table 2. Result of paired-samples T test among people choosing reusable chopsticks (*n* = 91).

Pair 1	Mean	SD
Environmental cognition toward reusable chopsticks	4.170	1.017
Safety cognition toward reusable chopsticks	2.993	0.947
Environmental cognition toward reusable chopsticks x Safety cognition toward reusable chopsticks	1.177 **	1.122

** $p < 0.01$; two-tailed tests.

Table 3. Result of paired-samples T test among people choosing disposable chopsticks (*n* = 126).

Pair 2	Mean	SD
Environmental cognition toward disposable chopsticks	2.841	0.998
Safety cognition toward disposable chopsticks	2.488	1.196
Safety cognition toward disposable chopsticks x Environmental cognition toward disposable chopsticks	0.353 **	1.209

** $p < 0.01$; two-tailed tests.

Table 4. Binary logistic regression results: main and interactive effects (*n* = 217).

Variables	Model 1	Model 2	Model 3
1. Intercept	−0.184 (0.598)	0.346 (0.656)	−0.037 (0.679)
2. Control variables			
Gender	0.094 (0.172)	0.079 (0.180)	0.082 (0.192)
Age	−0.245 (0.196)	−0.239 (0.210)	−0.316 (0.223)
Marital status	0.106 (0.187)	0.100 (0.202)	0.149 (0.212)
Income (1, . . . , 7)	n.s.	n.s.	n.s.
Education (1, . . . , 6)	n.s.	n.s.	n.s.
City location (eastern, western, central)	n.s.	n.s.	n.s.
GDP of the city lived in the longest	−0.010 (0.181)	−0.011 (0.192)	−0.070 (0.202)
3. Independent variables			
Environmental cognition toward reusable chopsticks		0.565 *** (0.178)	0.832 *** (0.229)
Safety cognition toward disposable chopsticks		−0.498 ** (0.175)	−0.655 *** (0.205)
Awareness of environment-related information		−0.169 (0.252)	−0.358 (0.276)
Awareness of safety-related information		0.182 (0.247)	0.240 (0.274)
4. Interaction variables			
Environmental cognition toward reusable chopsticks × Awareness of environment-related information			0.506 † (0.278)
Safety cognition toward reusable chopsticks × Awareness of environment-related information			−0.001 (0.264)
Safety cognition toward reusable chopsticks × Awareness of safety-related information			−0.677 * (0.324)
Environmental cognition toward reusable chopsticks × Awareness of safety-related information			0.011 (0.273)
R^2 (ΔR^2)	0.179	0.274 (0.095)	0.344 (0.07)

Income, education, and city location lived in the longest are categorical variables that were tested as a series of dummies. The full list is not displayed in this table but is available upon request. † $p < 0.07$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; two-tailed test.

3.4. The Contingent Effect of Awareness

Hypotheses 5a and 5b predict that awareness of environment-related information amplifies the relationship between the stereotype that reusable chopsticks are more environmentally friendly and engaging in PEB (5a) but has no influence on the link between the stereotype that disposable chopsticks are safer and engaging in PEB (5b). As shown in Model 3 in Table 4, the interaction between environment-related information awareness and the environmental stereotype is positively related to PEB ($\gamma = 0.506$, $p < 0.07$), but the interaction between the former and the safety stereotype has no impact on PEB ($\gamma = -0.001$, n.s.). Following Hayes [52] and Aiken and West [53], we plotted the first and significant moderating effect and conducted a slope test using PROCESS. Table 5 and Figure 2 illustrate

that in the presence of higher awareness of information related to the environment, the stereotype that reusable chopsticks are more environmentally friendly is positively related to PEB (γ = 1.11, p < 0.01), whereas when individuals were not aware of information related to the environment, the relationship becomes insignificant (γ = 0.18, n.s.).
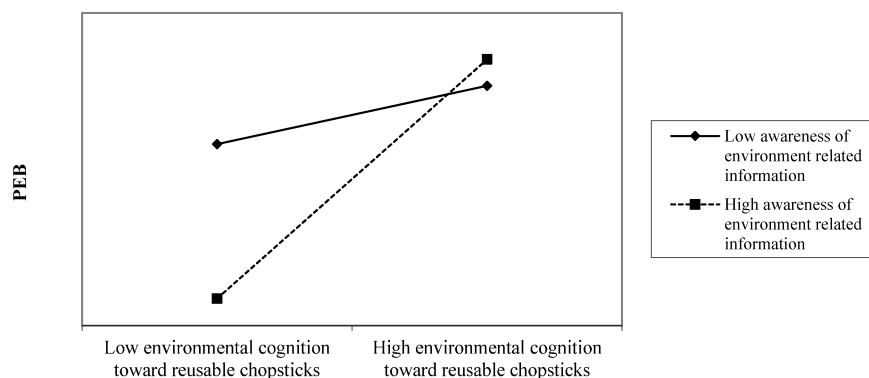

Figure 2. Interactive effect of environmental cognition toward reusable chopsticks and awareness of environment-related information on pro-environmental behavior.

Table 5. Conditional effect of awareness of environment-related information on pro-environmental behavior at values of the moderator (s).

Awareness of Environment-Related Information	Effect	S.E.	Z	*p*	LLCI	ULCI
−1.00	0.18	0.20	0.93	0.35	−0.20	0.57
0	0.65	0.19	3.43	0.00	0.28	1.02
1.00	1.11	0.32	3.42	0.00	0.47	1.75

Hypotheses 6a and 6b suggest that awareness of information regarding safety augments the negative association between the stereotype that disposable chopsticks are safer and PEB, which in turn promotes the choice of disposable chopsticks (6a) but has no effect on the link between the environmental stereotype and PEB (6b). As expected, the results in Model 3 of Table 4 show that the interaction between safety-related information awareness and the safety stereotype is negatively related to PEB (γ = −0.677, p < 0.05), and thus positively linked to choosing disposable chopsticks. However, the interaction between awareness of safety-related information and the environmental stereotype has no influence on PEB (γ = 0.011, n.s.). Following Hayes [52] and Aiken and West [53], we plotted the significant moderating effect and conducted a slope test using PROCESS [52]. As depicted in Figure 3 and Table 6, the stereotype that disposable chopsticks are safer is negatively related to PEB (γ = −1.04, p < 0.01) with high safety information awareness, whereas when the latter is low, the relationship becomes insignificant (γ = −0.04, n.s.). To sum up, Hypotheses 5a, 5b, 6a and 6b are all supported.
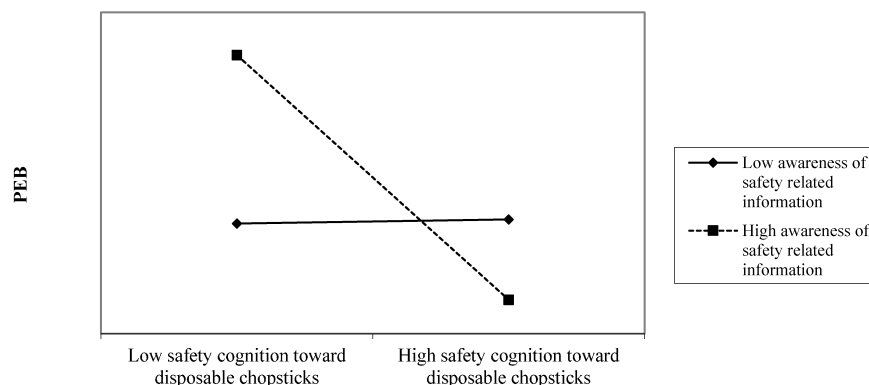
Figure 3. Interactive effect of safety cognition toward disposable chopsticks and awareness of safety-related information on pro-environmental behavior.

Table 6. Conditional effect of awareness of safety-related information on pro-environmental behavior at values of the moderator(s).

Awareness of Safety-Related Information	Effect	S.E.	Z	*p*	LLCI	ULCI
−1.00	−0.04	0.21	−0.20	0.84	−0.45	0.37
0	−0.54	0.17	−3.27	0.00	−0.87	−0.22
1.00	−1.04	0.28	−3.70	0.00	−1.59	−0.49

As a final confirmation, we also tested the impact of the interaction between environmental cognition of disposable chopsticks with awareness of environment-related information as well as the interaction between safety cognition of reusable chopsticks with awareness of safety-related information on the choice of disposable and reusable chopsticks, respectively, but found no significant (n.s.) results. The results of these tests are not reported here but are available upon request.

4. Discussion

This research examines what stereotypes about reusable chopsticks and disposable chopsticks are in people's minds, and whether and when such stereotypes affect individuals' pro-environmental behavior. In support of our conceptual analysis, we find that among the public in China there are stereotypes that reusable chopsticks are more environmentally friendly and that disposable chopsticks are safer. The former stereotype is positively related to pro-environmental behavior and the latter is negatively linked to pro-environmental behavior. These relationships are moderated by awareness of relevant information. When awareness of information related to the environment is high, the positive link between the environmental stereotype and pro-environmental behavior is accentuated, but the negative relationship between the safety stereotype and pro-environmental behavior remains unchanged. On the other hand, when awareness of information regarding safety is high, the negative relationship between the safety stereotype and pro-environmental behavior is augmented, but the positive link between the environmental stereotype and pro-environmental behavior is unaffected. The findings of this research generate some interesting theoretical and practical implications.

4.1. Theoretical Implications

The present research makes theoretical contributions to the environmental sustainability literature in the following ways. First, our findings add an important piece of empirical evidence to demonstrate the predictive power of the public's stereotypes for pro-environmental behavior. The environmental protection field is not new, but much existing literature examines similar antecedents for pro-environmental behavior such as gender, income, and education [6,7,53], as well

as individual attitudes, norms, and intentions [1,10]. While we attest to the predictive power of all other theories such as the theory of planned action for environmental behavior [2], we introduce a new conceptual rationale for pro-environmental and safety-related behavior. Stereotyping in the present research happens to be a new, yet powerful predictor of individuals' pro-environmental and safety behavior. While existing stereotype literature focuses on people, we apply this construct to the environment. Hence, our research fills this gap by applying stereotypes to the environmental literature and our findings are in accordance with the viewpoint that people process complex information in a simple cognitive way, with the help of a secure cognitive prison of stereotypes. Taken as a whole, our research findings serve as an innovation and extension of environmental literature.

Secondly, we adopt a new yet more concrete measuring method toward pro-environmental behavior. Our research setting is focused on the actual choice of different types of chopsticks. Much prior research uses a general measurement for pro-environmental behavior such as "avoid littering when outside", "using both sides of the paper sheet when drawing or printing a document" [1]. Our study narrows the environmental situation and specifically looks at actual individuals' choice of chopsticks through observing them in a natural environment. We measure pro-environmental behavior as an actual and observed behavior instead of attitude/intention [54] or self-reported behavior [40]. Individuals' behavior was observed without their knowledge and before asking them to participate in our study. Through this method, we also decreased the potential for socially desirable behavior. This specific approach and research context is more closely related to reality and thus makes our findings more reliable and practical.

Thirdly, the present research also makes a meaningful contribution to the stereotype literature. Despite the increased theoretical and empirical attention to stereotype [55,56], contradictions still exist as to whether stereotypes can be interposed by intervention strategies such as individuating information [55]. Although certain intervention strategies are proposed and have been proved to have some effect on weakening stereotypes [57], existing empirical evidence indicates that stereotyping is so ingrained in people's cognition that it can hardly be intervened [55]. Moreover, there exists no research exploring the intervention strategies of stereotypes in the environmental field. Furthermore, we put our focus on the positive type of stereotyping more than the negative one to provide a positive scholarship that is solution-based as opposed to only the diagnostic of a problem. Our results also point to the fact that two positive types of stereotype can exist in individuals that potentially have competing effects on environmental behavior.

Specifically, we find that people tend to ignore information incongruent with their structured memory [47], selectively pay attention to information congruent with memory [48], and perform in line with an existing stereotype, which in turn further strengthens the stereotype. We find that individuals act automatically based on their stereotypes, and we think this could be regardless of their belief system [1,2] if the cues for stereotyping are congruent with their ingrained memory. This finding indicates that changing such habitual behaviors that are based on stereotypes are harder than initially thought.

Finally, to the best of our knowledge, this is the first empirical study bridging the environmental and stereotype literature to unveil the contingent role of awareness of information on both environmentalism and safety. As discussed above, each of these two research topics are not new, but together they provide an insightful research perspective about the effect of media exposure on pro-environmental behavior, which so far has been inconsistent [58]. Our study introduces the consideration of stereotypes to pro-environmental behavior research and treats awareness of information as a moderator, finding that the influence of the latter on pro-environmental behavior depends on the matching degree between stereotypes and information. Specifically, exposure to the news media and information that promotes environmentalism strengthen the positive relationship between stereotypical environmental cognition and the likelihood of engaging in pro-environmental behavior. People with that stereotype are inclined to pay more attention to environmental information, which is congruent with their structured memory. In a similar vein, being aware of the information and

news media that convey safety messages, does not affect individuals with environmental cognition, but heightens the influence of safety cognition on decisions and behaviors that eradicate safety threats. Perhaps people with such stereotypes tend to notice the safety information, which is congruent with their structured memory and not heed competing information. However, individuals holding environmental (safety) stereotypes are more likely to overlook safety (environmental) information, resulting in a blank effect of awareness on pro-environmental behavior. Hence, the existing contradiction about the effect of media exposure on pro-environmental behavior [58] seems to have found a solution.

4.2. Practical Implications

The present research has significant practical implications as well, especially for policy makers who tend to work on environmental sustainability and awareness raising. We have shown that stereotypes about reusable and disposable chopsticks play a decisive role in individuals' pro-environmental behavior, that is, choosing to use reusable chopsticks or not. This result ought to serve as a warning that the public has already formed such stereotypes and that it is a great challenge to change their cognition or their behavior.

Many countries similar to China have allocated significant amounts of financial and publicity resources and energy to advocate for the application of reusable chopsticks and reduce the use of disposable chopsticks for the sake of forest and environmental protection. Yet, our findings indicate that although stereotypes about chopsticks among the public are too ingrained to be impacted by information provided by various sources, it could still be reinforced. Accordingly, the government should consider the specific content of information conveyed through particular types of mass media. In particular, if the government wants to promote the use of reusable chopsticks, it is suggested that the channels that report more news, information, and advertisements relevant to environmental protection be used. In this way, those who already hold a solid stereotype that reusable chopsticks are more environmentally friendly will certainly choose and use reusable chopsticks more often even though those who hold the stereotype that disposable chopsticks are safer, are less likely to change their minds or behavior, according to our findings.

There is also another group of people who sway precariously between these two choices, who do not hold stereotypes about safety or environment or hold both equally. There is a good chance to consolidate this latter type of people's environmental cognition about reusable chopsticks, which is beneficial to China's plan. On the other hand, in the context of China, it is of equal importance to strengthen the hygienic standards of restaurants and reduce news reports that reusable chopsticks are not thoroughly cleaned. Such plans, if implemented, may help to weaken the stereotype that disposable chopsticks are safer and reusable chopsticks are not as safe. In short, to effectively implement the policy of promoting the use of reusable chopsticks, the Chinese government needs to address the following two things. One is to increase the publicity power of promoting pro-environmental behavior through reusable chopsticks and increasing individuals' environmental awareness [40]. The other one is to reduce media reports of safety concerns by first fundamentally improving the hygienic state of restaurants and food items with forcible and punitive measures when necessary. In the long run, as the circular enforcement between safety stereotypes and media reports weaken, gradually promoting reusable and environmentally friendly chopsticks that are safe and clean can strengthen the environmental message and perhaps increase pro-environmental behavior.

4.3. Limitations and Directions for Future Research

As with any empirical study, this study, too, has several limitations that point to avenues for future research. First, we did not empirically test the possible mechanisms between individual stereotypes and pro-environmental behavior. Instead, in this research, we focused on and looked at the direct relationship between stereotypes and pro-environmental behavior. According to the theory of planned behavior [4], intention is the most proximal antecedent to predict an individual's behavior. Thus,

a valuable extension of the present research is to empirically test if there are any mediating constructs that link stereotypes and pro-environmental behavior.

Related to the above is, for example, the potential that the mechanism in which stereotypes work in people and lead to pro-environmental behavior involves their belief system and attitude [1,2,4]. The focus of our study is to find the effect of stereotyping about the safety or environmental contribution of the two types of chopsticks. Our position in this is that individuals' stereotype leads the automatic behavior [41] regardless of belief or attitude. We assume the stereotype approach to be an alternative to the pro-environmental behavior theses. However, future studies could test these two hypotheses (i.e., intention/belief and stereotype) together and find out whether they are complementary to or competing with one-another.

Second, as the first study to link stereotypes to individuals' pro-environmental behavior, we found that awareness of information selectively strengthens the corresponding relationship between stereotypes and pro-environmental or safety behavior. Nevertheless, it remains an interesting question as to what factors may interfere with a solid stereotype of environmentally friendly products (in our case chopsticks) and thus in turn change behavior. Prior research [55,59] suggests that as ingrained as stereotypes can get, intervention strategies still can suppress the stereotype and alter actions that automatically follows that stereotype. Therefore, we call for future research to further examine the moderators that bring intervening effects into play.

Third, the sample size of our research may not be large enough for a robust conclusion. We originally collected 316 questionnaires, but only 217 were included in the final sample due to a rigorous screening process. While we collected data around Beijing to increase the possibility of gaining a sample representative of the entire country and to some extent we achieved this goal, effort could be made to collect data from an even more representative sample. We call for research containing more data with a greater representation of participants from diverse urban and rural areas of China to replicate our study, so that the results will be more robust.

Finally, future research may explore whether our findings can be replicated in other cultural contexts or in other situations. We believe that this study can be generalized to other countries as well. The context of China in our research created a unique opportunity to test and compare the effects of two types of stereotypes simultaneously. The relatively equal existence of safety and environmental concerns are not necessarily as easy to find in other places. This comparison implies that our findings regarding the type of stereotype and awareness of information and their impact on decisions and behavior is robust and generalizable. It is true that the current study on reusable and disposable chopsticks as well as the dyadic of safety and environment is very China specific. However, chopsticks are used in many other cultures as well. While we think our findings are relevant to them, future studies can see if our prediction could be extended to those regions. In addition, in many countries where people do not use chopsticks, other disposable utensils can be used to examine our findings. Furthermore, the issue of food safety or at least the stereotype of it is present in many developing and even developed countries. It is valuable to accumulate empirical evidence from multiple studies to be conducted in heterogeneous cultures and varied contexts, such as, for example, the use of plastic or reusable bags when shopping or the use of disposable or refillable water bottles. Without individual studies such as the current one, such reviews will not be possible. Hence, our research provides an impetus for future research and meaningful input for the accumulation of knowledge in this emerging area.

5. Conclusions

Although a plethora of literature has envisaged the importance of media exposure in individuals' pro-environmental behavior, this study is the first to combine two types of positive stereotypes with the environmental research field. In particular, our results indicate that solid stereotypes about reusable and disposable chopsticks have been formed among the Chinese public, and awareness of the right type of information can only reinforce but not interfere with these stereotypes. Therefore, the government

and other organizations should pay particular attention to the specific content of their message and communication channels. We believe our study offers needed conceptual and empirical advancement for the literature on environmental and stereotype fields to conduct more in-depth investigation to reveal the external and internal mechanisms underlying individual pro-environmental behavior in complex settings.

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