

**HOW DOES CULTURE OR DEVELOPMENT
CONSTRUCT THE WAY PEOPLE THINK
ABOUT AND ACT TOWARDS THE
ENVIRONMENT?**

A THESIS

Presented to

The Faculty of the Environmental Program

The Colorado College

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Arts in Environmental Science

By

Siqi Wei

May 2017

Dr. Howard Drossman
Professor

Dr. Miro Kummel
Associate Professor

Table of Contents

Abstract.....	1
Introduction.....	2
Methods.....	8
Results.....	13
Conclusion.....	41
Appendix1.....	44
Appendix2.....	48
Citations.....	49

ABSTRACT

This study examines the similarities and differences in environmental values and attitudes between Chinese and US college students, and predicts their correlation with one's intention to take environmental actions. Quantitative findings suggest that the majority of participants in both groups share a similar level of environmental knowledge and converged environmental attitudes except for their perception of nature. Qualitative findings, however, reveal that the perception of environmental problems and structure environmental attitudes differ greatly between these two groups of participants insofar their similar levels of environmental concerns. Contextual factors between these two cultures are also explored to evaluate their enabling or constraining effects on environmental behaviors. This study represents a substantial step in building a better understanding of the interplay between social and cultural practices and environmental attitudes. It also has great implication for promoting the efficiency of the practice of environmental education at an international level.

INTRODUCTION

In the course of environmental crisis, scientists, scholars and activists have tried to awaken people's awareness towards the environment and engage the public into environmental movements through a variety of means. As the pioneers entering into a new development state labeled as "postindustrial", many Western countries witnessed a rising environmental interests prior to the other countries (Pierce & Tsurutani, 1987). One the first signs of US's transition towards a more environmental-minded society appeared in literature works. In 1962, the publication of Rachel Carson's *Silent Spring* revealed how human intervention by using synthetic pesticides have the potential to irrevocably alter ecosystems. Her book sent the world a powerful message that questioned our relation with the environment, and a warning of how we might see ourselves in the future (Carson, 1962). Her book also marked the start of the US environmental movement by catalyzing an emerging awareness of human-environment relationships. Other literary works also contributed significantly to the development of modern environmental movement, such as Aldo Leopold's essay *The Land Ethic* (1948) in which he advocated for an ecocentric view. His ecocentric philosophy still echo in many literary works in the modern environmental field.

Along with the rising environmental awareness that is evident in US literature, many countries also witnessed the entry of environmental problems into their social and political agendas. The end of World War II brought many countries' attention to environmental issues, which allowed the environmental movement to grow internationally (Carter & Simmons, 2010). The conference for the International Union for

the Protection of Nature (IUCN) in 1948 marked the beginning of collective efforts from many countries to pursue environmental goals. The union of international efforts announced the start of a new chapter when numerous environmentally focused regulations and acts were passed, opening up both opportunities and challenges for world citizens to pursue the path of developing a sustainable future.

Consequently, researchers in the social and behavioral sciences have looked into the structures of environmental values and behaviors so as to translate the abstract concepts into concrete guidelines. Traditionally, pro-environmental behavior was modeled as linearly associated with increasing environmental concerns, which was perceived as a direct outcome of growing environmental knowledge (Newman, 2006). One example of this traditional thinking is the “Behavioral Change System” (Hungerford & Volk, 1990). However, researchers later started questioning the validity of the linear causal model, as they found environmental concern is not a reliable predictor of pro-environmental behavior. Since the ultimate goal of education is to shape behavior, researchers have referred to the principles of environmental education to generate a better understanding of how to operationalize responsible environmental behavior (Hungerford & Volk, 1990). One of the most universally recognized definitions of environmental education (EE) comes from the 1977 Tbilisi Intergovernmental Conference on Environmental Education with the following objectives of EE:

Awareness – to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.

Knowledge – to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.

Attitudes – to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

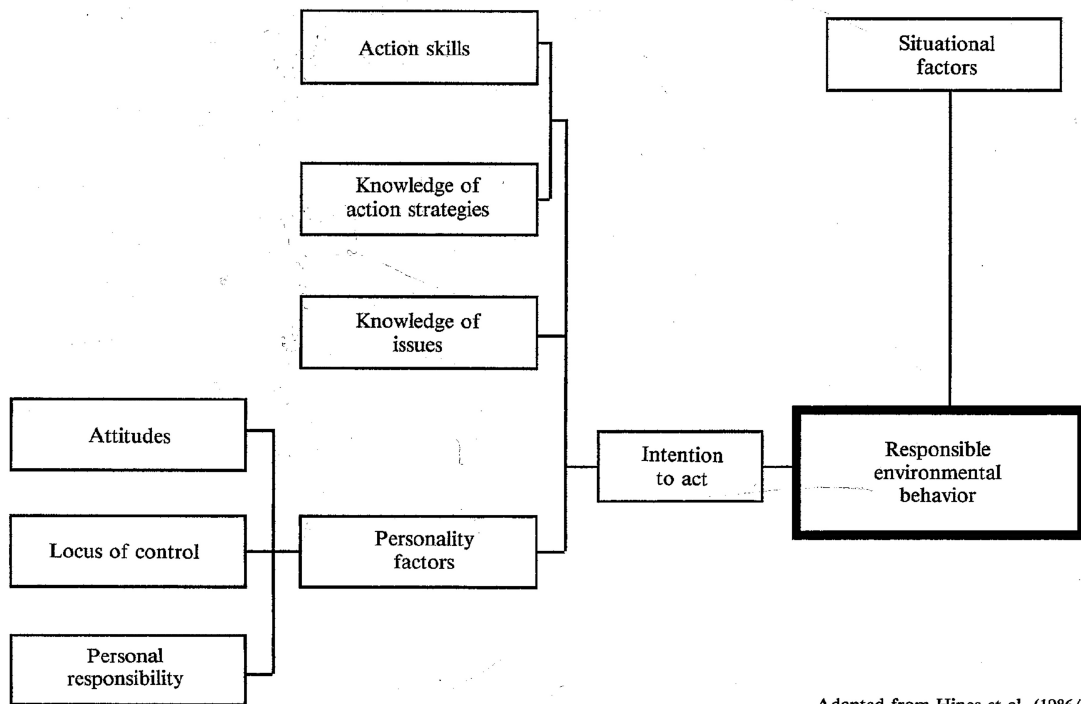
Skills – to help social groups and individuals acquire the skills for identifying and solving environmental problems.

Participation – to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

Many researchers have made the attempt to incorporate these ambiguous principles into instructional practice. A major breakthrough in this field is Hines' (1987) meta-analysis study, which found that knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, and an individual's sense of responsibility have the most formative effects on developing environmentally responsible behavior (ERB). He (1987) hence proposed a framework of ERB (Fig. 1), which describes a causal relationship between different variables and their collective significance in inspiring responsible environmental behavior. This model was then adapted and developed by Hungerford and Volk (1990) as the Behavior Flow Chart (BFC) (Fig. 2). Instead of

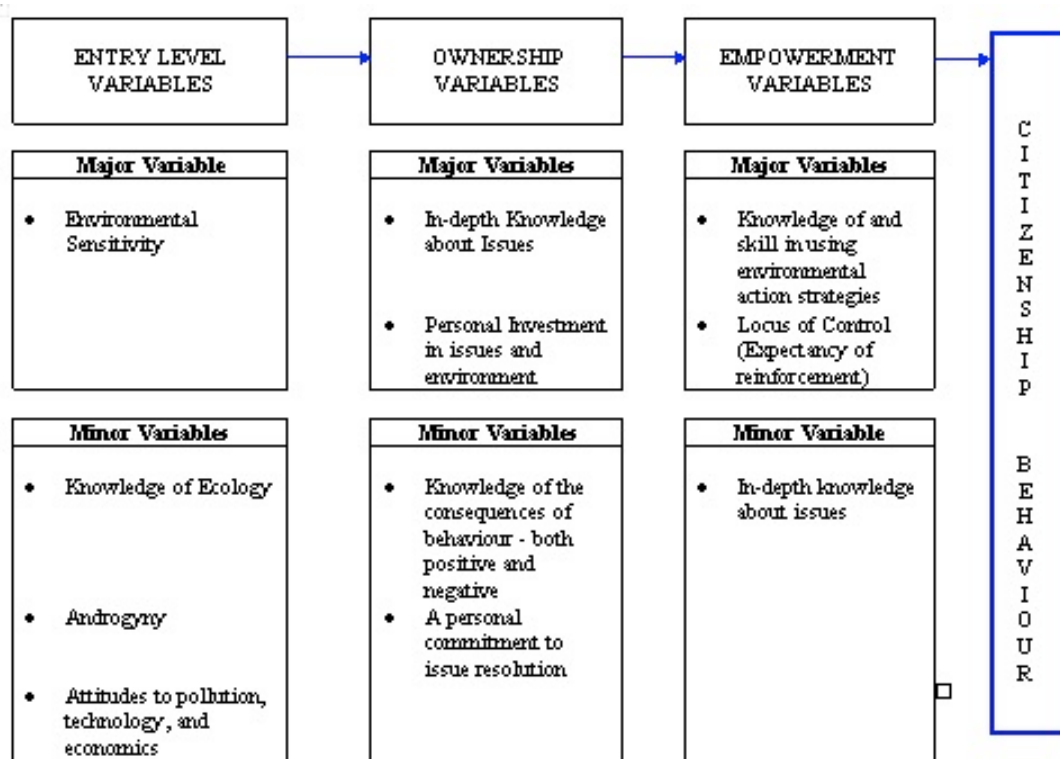
emphasizing the association between specific variables, the BFC classified variables into three levels – entry-level, ownership, and empowerment, and pointed out the synergistic nature among the variables (see Hungerford & Volk, 1990). Other studies have also focused on the correlation between socio-demographic factors and environmental concerns, including age, education, gender and political affiliation (Dunlap and Van Liere, 1978; Schultz & Stone, 1994; Schultz & Zelezny, 1999).

Fig. 1. Hines Model of Responsible Environmental Behavior



Adapted from Hines et al. (1986/87).

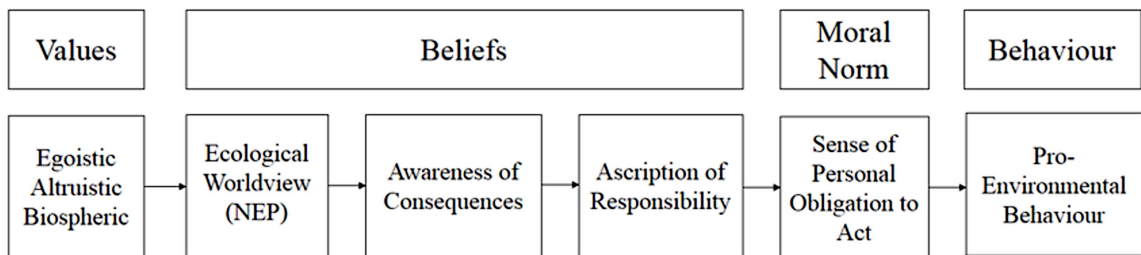
Fig. 2. Hungerford and Volk's Behavioral Flow Chart



Though many models and theories regarding environmental behaviors have been established, only a few of them had been practiced internationally because of the inconclusive nature of environmental literature (Johnson, 2004). Nonetheless, in recent decades, with the recognition of this research gap, efforts have been put into studying the function of cultural traits and values in initiating environmental behaviors. As a result, many cross-cultural studies were conducted to testify if the existing environmental theories or models are internationally applicable (i.e. Schultz & Zelezny, 1999; Pierce, Lovirch, & Tsurutani, 1987; Kimberly & Colleen, 2002; Bamberg & Moser, 2007). Schultz and Zelezny's (1999) meta-analysis across fourteen countries ascertains the validity of value-basis theory where environmental attitudes are found directly linked to individual's value systems. One example of the value-basis theory is Stern's (2000)

value-belief norm (VBN) model where beliefs are positioned after personal values and as a precursor of personal norms and pro-environmental behavior (Fig. 3). Deng (2006) further expands the value-basis theory by including social and cultural practices as the foundation of environmental values and attitudes.

Fig. 3. Stern’s Value-belief-norm Model



As one of the largest carbon emitters in the world, China has been taking mitigation measures to address environmental problems. One evidence is its implementation of increasingly stricter environmental regulations in recent years (Yuan & Zuo 2012). However, even though top-down approaches are essential for change, experiences from other countries suggest that grassroots level movements are the real driver of a meaningful and far-reaching environmental movement (Khan, 2012). For example, in many Western countries, the emergence of conscious consumers slowly changed the structure of market by requiring green or environmental-friendly products, thus engaging stakeholders from different fields into the environmental conversation (Khan, 2012). There are a few studies looking at correlations between environmental knowledge, attitudes and behaviors among Chinese population (Deng, 2006; Jamelske, 2015). However, the existing studies tend to sum values into structural views and group up

people with certain traits to analyze thinking and behavioral patterns. This type of approach fails to recognize the implications of those dispositions or to suggest further enhancements for environmental movements. It also downplays the significance of individuals by not probing attitudes at deeper levels. To address the scarcity of this field, this study uses a mixed method to analyze the structure of environmental attitudes of Chinese population. The research concern of this study is: how does culture or development construct the way people think about and act towards the environment? As research suggests that environmental attitudes and behaviors are embedded into social practices and cultural values (Deng 2006), this work compares environmental knowledge, attitudes and values between US and China. This study chose to focus on college students in both China and the US because they will play a pivotal rule in leading the environmental movements in the near future.

METHODS

Participants

Participants were selected primarily based on their nationality and educational background. Participants were not randomly selected but were contacted through researcher's acquaintances. The research was conducted on a total of 16 participants; half were Chinese undergraduates and the other half were American undergraduates with an equal number of self-identified male and female students from each country.

The original aim of this research was to purposefully select students from schools that are located extensively across the nation in both China and the U.S. to minimize regional

differences regarding the level of environmental awareness and actions. However, all the Chinese participants who were reached were studying at top universities in China, which are concentrated in eastern China (Table 1).

Furthermore, as environmental education has not been generalized into higher education institutes (Ting, 2014), the research targeted students majoring in environmental science or related majors in Chinese universities to engage in environmental conversations. To hold the variables of educational background constant, US participants were also environmental majors but with a broader range of focuses (Table 1).

Table 1. Participant demographics

	University	Major	Year at College
CM1	Tsinghua University	Environmental Engineering	Junior
CM2	Fudan University	Environmental Science	Junior
CM3	Peking University	Environmental Science	Sophomore
CM4	Fudan University	Environmental Science	Junior
CF5	Tsinghua University	Environmental Engineering	Junior
CF6	Wuhan University	Environmental Engineering	Junior
CF7	Shanghai University	Environmental Engineering	Junior
CF8	Beijing Forestry University	Environmental Engineering	Junior
US1	Colorado College	Environmental Science	Junior
US2	Gonzaga University	Biology (with an environmental emphasis)	Senior
US3	UC Berkley	Environmental Science	Sophomore
US4	Ball State University	Environmental Science	Recent graduate
US5	Colorado College	Environmental Science	Junior
US6	UC Santa Clara	Environmental Studies	Junior
US7	Washington and Lee University	Geology (with an environmental science minor)	Junior
US8	Smith College	Geology (with an environmental emphasis)	Recent graduate

Quantitative survey

Each participant was required to complete a questionnaire consisting of 50 questions to explore their environmental knowledge and attitudes. The questionnaire included two parts. The first part contained 10 questions relating to scientific knowledge, which were adapted from NEETF/Roper Survey (Coyle, 2005). The original survey has been widely used to assess the environmental literacy of the US citizens. The second part of the questionnaire was designed with 40 Likert-scale questions to assess participants' environmental attitudes. The questions in the second part are adapted from Milfont's (2010) Environmental Attitude Inventory (EAI), which includes 12 sets of scales spanning different aspects of environmental attitudes. To make the questionnaire manageable for participants, only four of the scales were chosen for the questionnaire, which are "scale 1: Environment of nature", scale 4: Conservation motivated by anthropocentric concerns, scale 10: Human utilization of nature, and scale 12: Support for population growth policies. The reliability of EAI is built upon prior work measuring environmental attitudes, and has been evaluated by studies with "high internal consistency, homogeneity, and high test-retest reliability" (Milfont, 2010). The questionnaire was later created on Google Form, as suggested by the participants, and was used by the majority of US participants. However, one of the questions in scale 12 was omitted by the researcher during the process of typing, therefore the final analysis was ran based on a total number of 39 questions. Electronic copies of the questionnaire were sent to Chinese participants through email since Google is not available in China. All questions used are listed in Appendix 1.

The questionnaire for Chinese participants was translated into Chinese by me and another bilingual student from Fudan University. Three questions asking about carbon emission, sources of energy consumption and processing of trash in the context of the U.S. were modified to associate with corresponding environmental facts in China. The remaining content of the questionnaire was the same for Chinese and US participants.

Participants' answers to the first nine single-choice questions in the first part of the questionnaire were scored, and a t-test was run to compare the score of US and Chinese participants. Participants' short answer to the last question about agriculture are evaluated and compared by the researcher.

In the second part of the questionnaire, four scales of environmental attitudes are measured independently. Participants were instructed as follows: "The following questions are designed to assess your environmental values and attitudes. The questions are divided into four parts, with each part focusing on different value orientations. You should put the letter 'x' under the number that best represents your stance on each statement below." Items are measured using a 5-point scale (1 = strong agree, 2 = somewhat agree, 3 = neutral/no opinion, 4 = somewhat disagree, 5 = strongly agree). However, for the ease of interpretation in later analyses, the numbers associated with each stance were reversed so that 5 would represent "strongly agree" and 1 as "strongly disagree." This correction resulted in the following scale:

1 = strongly disagree

2 = somewhat disagree

3 = neutral/no opinion

4 = somewhat agree

5 = strongly agree

In each scale, half of the questions are reversely coded and therefore portray the opposite scenario. For example, in the “Enjoyment of nature” scale, the first question “I am NOT the kind of person who loves spending time in wild, untamed wilderness areas” is a reversed coded item, indicating that a disagreement with this statement suggests the endorsement of this specific attitude. Considering this nature of the scales, the Likert-scale numbers of all the reversed questions are flipped to represent same value orientations. For example, if the participant choose 1 in the question mentioned above (after the correction), which means the participant posses a great passion for nature, the participant’s score will be changed to 5 to represent his/her agreement with the overall value of the scale.

Averages of Likert-scale numbers for each question are calculated and categorized based on their belonging scales and countries. An f-test was ran for each scale to decide the variance, which is followed by a two-tail t-test.

Qualitative interview

Interviews were conducted after the corresponding questionnaire was completed. The interview was comprised of 14 structured, open-ended questions to explore participants’ environmental beliefs from multiple dimensions to better understand how cultural

components influence the structure of environmental awareness. The interview questions were categorized into environmental attitudes, awareness, perception of environmental problems, and social influence. Interviews were conducted in English with American participants and in Chinese with Chinese participants. All the interviews were recorded with participants' consent (Appendix 2) and transcribed. I translated and transcribed the transcripts of Chinese participants. Each interview lasted for 30 – 50 minutes.

Data Analysis

All the interviews were coded on Nvivo. The coding process adopts the method of theming the data, which is “the form of capturing the phenomenon one tries to understand” (p.87). The thematic analysis helped the research to organize the data based on participants' meanings and outcomes (Saldaña, 2016).

RESULTS

As indicated by Hungerford and Volk's (1990) work and Hines' (1986) meta-analysis of environmental behavior, “intention to act” and locus of control are two pivotal factors leading to environmental actions. The significance of these two factors is also confirmed in other studies (Schultz & Zelezny, 1999; Bamberg & Moser, 2007; Newman, 2006).

In Stern's (2000) VBN theory, individuals' value systems influence their environmental beliefs, which are connected to pro-environmental behaviors through the “sense of obligation to take pro-environmental actions.” Essentially, the "sense of obligation," which is labeled as the pro-environmental personal norm, is a representation of "intention

to act," as they both serve as indicators of environmental actions. However, "intention to act" is often ambiguously defined due to its interwoven relations with other variables.

Therefore, my discussion will compare exemplars of this variable from students in the US and China as the key to unfolding the overlapping and contrasting aspects in the cultural assets that are accountable for environmental behaviors.

1. Locus of control and intention to act

As a representation of pro-environmental intent, the sense of obligation of acting environmentally has been shown to be the most significant when individuals perceive the efficacy of certain behaviors (Eden, 1993). Bandura (2001) pointed out that "whatever other factors may operate as guides and motivators, [efficacy beliefs] are rooted in the core belief that one has the power to produce effects by one's actions" (Bandura, 2001, 10). Thus, individuals will have stronger intention and more incentive to act if they believe their actions can generate desirable results.

The importance of self-efficacy is also reflected in Hungerford and Volk's (1990) model, but is related to "locus of control." There are two types of locus of control – internal and external. Individuals with an internal locus of control have more faith in their power of making a change. On the contrary, individuals with external locus of control do not perceive the efficacy of their actions. Consequently, individuals with internal locus of control will more likely take environmental actions than the ones with external locus of control. Interestingly, responses from US participants reveal more internal locus of control whereas Chinese participants show more external locus of control. Every US

participant defined themselves as an environmentalist, which I interpret as them seeing themselves as the active agents in environmental movements. For example, when asked if the subject view themselves as an environmentalist, one US participant answered:

Yes, I consider myself as an environmentalist. I think that I have always been an advocate for the environment. I always think to change my actions in a way that work a lot better for the environment. I also think it's evident in the major I have chosen and the career that I would like to pursue.

Compared to those from the US, only two of the eight (25%) Chinese participants saw themselves as environmentalists, while the others criticized their actions as not adequate or influential. One Chinese participant commented:

According to my definition of environmentalist, which is to engage in a lot of environmental protection activities and to promote environmental movements, I shouldn't be counted as an environmentalist... I just have some pro-environmental habits, but I am not as committed as environmentalists should be.

Another Chinese participant is skeptical of the significance of his actions and has hence ascribed the responsibility to “more powerful” agents, as he noted:

In recent years, I feel the power of individuals is inadequate. Although taking pro-environmental actions makes me feel better, the influence is small on the

environment. Therefore, the environment still depends on decision-makers in terms of how many natural resources are required to be developed.

To compare, the perception of self-efficacy of one US participant was articulated as follows:

Every single decision we made kind of goes one way or the other [regarding their positive and negative impacts on the environment]... I want to live my life whether the way I vote or do as much as I can to protect and promote the needs of nature.

An internal locus of control is directly related to strong intention to act and functions as a key determinant to developing pro-environmental actions. In addition, internal locus of control also shapes the course of the individual's development of ecological stewardship, as self-perceived efficacy will reinforce the predisposition of taking certain actions (Bandura, 2010). That being said, individuals with a well-developed internal locus of control have the tendency to become increasingly involved with environmental activities, whereas individuals with an external locus of control might show hesitance in becoming involved in environmental actions and thus, slowly lose their passion for acting pro-environmentally. In the following section, I explore how locus of control is influenced by other contributors to pro-environmental behaviors through the investigation of the perceptions and contexts residing in social and cultural differences. In light of the time frame and qualitative nature of this study, I will focus on the environmental knowledge, attitudes and contextual factors in their relation with locus of control.

2. Knowledge and locus of control

Though not an entry-level variable, environmental knowledge is one factor for initiating environmental behaviors. The Tbilisi Declaration (1977) implicates knowledge as one of the major objectives of environmental education to foster environmentally literate citizens. Hungerford (1990) depicts a causal relationship between environmental knowledge and internal locus of control as he states that individuals must recognize the existence of the problem based on related information, and established comprehension to intentionally act on the problem. He (1990) further classifies knowledge into two types – the knowledge of the problem and the knowledge of the course of actions, which are both required for environmental actions to take place.

Even though three US participants got all correct answers and only one Chinese participant got all correct answers, the difference of score between these two groups based on the t-test results was not statistically significant ($p = 0.12$; Table 2), indicating that US and Chinese participants have similar levels of understanding on rudimentary environmental knowledge.

Table 2. Comparison for environmental knowledge

	<i>Chinese</i>	<i>US</i>
Mean	80.56	88.89
SD	0.15	0.12
P-value	0.12	

Note: The score is calculated based on the percentage of accuracy.

The last short-answer question asks participants to list at least three problems relating to conventional farming to assess participants' systematic understanding of environmental issues. Almost all participants approached this problem from multiple perspectives and no pattern was found that addressed the discrepancy in knowledge between US and Chinese participants' responses. Habitat destruction as the adverse outcome of conventional farming was mentioned most often by the Chinese participants, whereas the application of pesticides and fertilizer was mentioned most often by US participants.

Knowledge of environmental action strategies is usually inspired by and established upon environmental knowledge as more in-depth understanding of a specific problem can inform people about action strategies and hence prompt responsible environmental behaviors (Hungerford & Volk, 1990). Participants were asked to list their positive impacts on the environment through their personal behaviors as a way to assess their knowledge of environmental actions and hence evaluate the perceived efficacy of certain behaviors. Examples of conserving water and energy are most commonly mentioned by all the participants. An emerging theme addressed by US participants is the food industry, the concern of which drove half of them to be vegetarians. One US participant commented:

I am a vegetarian because I know that not eating meat can be a very impactful way to minimize my own footprint.

However, none of the Chinese participants mentioned the food industry. When asked about their opinions about vegetarian diets, one Chinese participant argued:

I don't think there are people who are willing to change their diet just to protect the environment.

Another Chinese participant described being vegetarian as holding a faith, which defines vegetarianism as a spiritual involvement. This analogy implies that this Chinese participant does not perceive being vegetarian as impactful, whereas the US participant quoted above believes that every action matters. Since the ecological benefits of vegetarian diets are scientifically proven and universally recognized (Marlow 2009), Chinese participants seem to disregard the environmental benefits of being vegetarian, implying an inadequate level of knowledge about certain environmental action strategies or an external locus of control. The dichotomous opinions about vegetarianism echoes the assumption made about the locus of control between the US and Chinese participants; US participants have developed a greater internal locus of control through the perception of environmental action strategies on a wider spectrum. While many factors are accountable for these different views on environmental issues (i.e. personal experiences, scientific knowledge), the discrepancy of perceived effectiveness of certain actions between students from these two nations is likely due to divergent sources of environmental information. With increasing media coverage of environmental issues after the release of IPCC AR4 (Jamelske 2015), the public in China is better informed about environmental degradation causes and environmental initiatives. Nonetheless, since the Chinese media is

mostly controlled by the government and educational institutions are affiliated with the central government, environmental information that is released to the public or to students aligns with national interests (Jamelske 2015). As a result, the government takes the lead in setting up agendas for environmental discourse, and it is not surprising to discover more uniformity in Chinese participants' responses. When talking about the loopholes in environmental management, one Chinese participant even brought up the hegemonic nature of Chinese media and its implication for the public discussion of environmental topics:

It is difficult to realize the issues of environmental management. The public gets the information about the environment through national release of the news, but the national environmental department won't disclose their own shortcomings or inefficiencies. In fact, I could hardly imagine the situation that environmental regulations from the central government are difficult to be implemented before I did my research. Many real environmental problems can only be learned through research.

The influential role of Chinese media is also shown by Chinese participants' perceptions of the general public regarding environmental problems. When participants were asked to speculate about the biggest environmental problem that would be identified by the public in their respective country, all the Chinese participants pointed to air pollution, whereas the US participants provided a variety of answers, including energy dependence, water shortage, and rising temperature. The authoritative power of Chinese media in forming public opinions about the environment is articulated as follows:

Yes, [I think most Chinese people would agree that the biggest environmental problem is air pollution], because the media focuses on air pollution the most.

This finding agrees with previous studies where Chinese college students are significantly more aligned with mainstream scientific conclusions regarding beliefs and causes of climate change in comparison to US college students (Jamelske 2015). However, it is necessary to consider that air pollution is more threatening in China than it is in the US. The severity of air pollution in China directly contributes to negative personal experiences, which could be more convincing to the public's beliefs about environmental conditions than intermediary outlets.

3. Attitudes and Locus of Control

Based on Stern's (2000) VBN theory, environmental attitudes are subsets of the broader value systems and serve as the mediator of value orientations and environmental behaviors. In the course of pursuing sustainability on the international level, many cross-cultural studies have made the attempt to include social and cultural references to study the correlation among values, attitudes and behaviors (Schultz & Zelezny, 1999; Kemmelmeier 2002). However, a major approach taken by these researches is clustering values at societal levels and monitoring variables quantitatively. The quantitative approach only sheds light on the tendency for certain groups to take certain actions, but fails to explore the structure of environmental attitudes to a fuller extent and hence to promote environmental behaviors. Therefore, there is an increasing need to study environmental attitudes at a deeper level, especially among environmentally literate

college students who are likely to take the lead in advancing the environmental movement in the near future.

That being said, the purpose of this section is to explore the correlation between cultural experiences and environmental attitudes of Chinese and US participants by qualitatively analyzing their interviews. Then this section will proceed to evaluate the disparities of environmental attitudes between these two cultures and hypothesize their implications relating to locus of control.

As described in the method section, environmental attitudes or beliefs in this study are measured quantitatively through four chosen dimensions: enjoyment of nature, conservation motivated by anthropocentric concern, human utilization of nature, and support for population growth policies. The t-test (Table 3) results show that Chinese and US participants hold very different views on the first scale (enjoyment of nature) but share similar attitudes toward the last three scales (conservation motivated by anthropocentric concern, human utilization of nature, support for population growth policies). Underlying reasons for the disparities and similarities between these two different cultures are discussed below.

Table 3. Comparison of Environmental Values and Attitudes

<i>Scale</i>	<i>Nation</i>	<i>Mean</i>	<i>SD</i>	<i>P-value</i>
1. Enjoyment of nature	China	3.83	0.32	<0.005
	US	4.61	0.37	
2. Conservation motivated by anthropocentric concern	China	2.25	0.51	0.83
	US	2.21	0.35	
3. Human utilization of nature	China	2.51	0.56	0.08
	US	2.12	0.86	
4. Support for population growth policies	China	3.67	0.36	0.16
	US	3.19	0.70	

Note: Values shown above are after the correction (1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

3.1 Enjoyment of nature

According to Milfont's (2007) definition, this scale indicates that individuals prefer spending more time in nature than in urban areas by gaining greater pleasure in the natural environment. Even though all participants indicated pleasant feelings towards nature, US participants have suggested a higher level of attachment towards nature than Chinese participants ($p < 0.005$; Mean (US) > Mean (China); Table 3). This discrepancy is also evident in the interviews where US participants generally expressed a strong sense of appreciation and devotion towards nature. Effective elements are often found in US participants' responses, which is exemplified in the following citation:

I think being in nature is a recharge for me. It's where I feel the most connected and where I understand who I am the most. It's kind of a place of calm[ness], and also curiosity.

One US participant discussed his connection with nature as spiritual, indicating a deeper level of feeling. In comparison, the majority of Chinese participants stated more reserved feelings towards nature; affective words like “happy” or “relaxing” to describe feelings in the natural environment were only mentioned by one Chinese participant but were used repetitively by most US participants. Chinese participants tend to depict their relationship with nature in broader and more conceptual terms, as shown in one of the quotes:

The relationship between human and nature should be defined as interdependence. Humans and nature should promote each other and develop a harmonic relationship. Nature gave me the things that I need. In return, I will do my best to slow down the consumption rate of natural resources.

Two Chinese participants expressed a rather indifferent feeling towards nature. As one of them noted:

The relationship between me and nature ... I do not think there is much of a relationship between me and nature... I barely had direct contact with nature.

Therefore, the quantitative analysis is supported by qualitative observations that Chinese participants are less affectively involved with nature than are US participants. One explanation for this phenomenon could be found in Bandura’s (1982) human development theory. He asserted that children’s inner lives are accounted for actions and define their social reality in their adulthood, implying that childhood experiences in nature on a recurrent basis will positively contribute to a sense of affiliation with nature,

and consequently promote pro-environmental thinking and behaviors. This positive role of time outdoors from childhood memories in leading to environmental path is attested by other studies (Chawla, 1999; Kellert, 2002). Research suggests that China is experiencing an ever-increasing pace of urbanization, and the existence of natural environment is decreasing rapidly (Li, 2014). Professor Yu Huang from Beijing Normal University asserted that urbanization significantly curtailed opportunities to go into woods for the youth (Bao, 2011). All Chinese participants have mentioned development in their hometown to different degrees, which could explain their dwindling exposure to natural environment. Furthermore, it is noteworthy that all US participants mentioned their childhood memories in nature, which most of them believe have bridged their connection to nature. One US participant noted:

Growing up we had family in northern California that we would stay with every summer, that's up in the mountains. So I guess nature is always a huge part of my childhood... spending every summer in the woods got me in touch with nature and animals.

In contrast, only two Chinese participants described their childhood memories in nature in the interviews. Their narrative is also very different from the description of outdoor experiences from US participants, as illustrated in the following quotation:

I used to catch grasshoppers... during winter we had snow fights and built a snowman. We also used to build a snow house and I could stand in it.

Kellert (2002) categorized youth's contact with nature into direct, indirect and "vicarious" experiences, which are ranked with decreasing exposure to natural elements. US participants' childhood experiences in nature can be summarized as through direct contact where they experienced nature in a setting that's independent from human built environment. Chinese participants' contacts with nature are more parallel to indirect experiences, which are built upon artificial landscapes, and are likely to happen in more programmed contexts. Research suggests that children in China rarely went to natural environment to play (Bao, 2011). Participants who considered they are separate from nature also discussed the physical distance of their residence in relation to nature. As one Chinese participant commented:

I am not that interested in nature. I am a city person. So I think I am not really connected to nature. I know my food comes from nature, but I really don't feel like I am connected to it.

This implies that physical distance from nature, especially during childhood, can result in sense of alienation from nature. Vining and Merrick (2008) also share the same understanding - their study discovered that people who considered themselves as separate from nature attributed the cause to their distant location of residences from nature. One US participant also acknowledged this contextual limitation and its corresponding outcomes:

I think the way I got connected to [nature] is because I had access to it. There were areas where I grew up where I could be in the outdoors. But I think a lot people

don't have access to the outdoors, which is part of the reason why they are disconnected from it, because people have to drive so far to the national parks. So I was just lucky to have [access to nature].

The feeling of separation from nature may contribute negatively to developing an internal locus of control to take environmental actions. In turn, people who take ownership of the natural environment are more likely to display pro-environmental behaviors (Chawla, 1999). This theory is reflected in one US participant's response:

I think a lot people [in the U.S] detach and think [that] nature is disconnected from us... I kind of think the opposite of that [nature is disconnected from us]. I think everything is very inter-connected, and we can't look at nature without putting ourselves into the same picture. That's also part of the reason we don't think our actions are impacting the environment because we see it as a distant place.

To summarize, in comparison to US participants, Chinese participants generally have less contact with nature in their childhood, and most of them have consequently developed a sense of disconnection with nature, which may explain the discovered discrepancy in locus of control between them and US participants.

3.2 Conservation motivated by anthropocentric concern

Milfont (2010) defines this scale as “support for conservation policies and protection of the environment motivated by anthropocentric concern for human welfare and gratification, versus support for such policies motivated by concern from nature and the

environment as having value in themselves” (p.90). This definition contains two conflicting philosophical concepts: anthropocentrism and ecocentrism.¹ Martinez (2008) states that those who ascribe to anthropocentrism emphasize the centrality of humans, whereas those who ascribe to ecocentrism recognize the intrinsic values of all living species on earth. The lack of a significant difference between Chinese and US students relative to the anthropocentrism scale ($p = 0.83$; Table 3) indicates that, on a spectrum ranging from anthropocentric to ecocentric values, the orientation of US and Chinese participants are not different, and the mean value implies that their attitudes include more ecocentric components than anthropocentric. This quantitative finding is consistent with participants’ qualitative reasoning. Examples of ecocentric views can be distinguished from statements deemphasizing the power of humans and addressing the connections between humans and nature, as illustrated by one Chinese participant:

I think people shouldn't think that they use or they have conquered nature. Instead, people should have the mindset that we are receiving help from nature to survive and to develop. I have read a book about the Gaia hypothesis, which describes the entire planet as a living organism. The whole earth is an organism. The theory describing the relationship between humans and nature is more in line with the current situation, and it should be encouraged.

One US participant discussed the human-nature relationship in a hierarchical manner and portrayed humans as inferior to nature:

¹ In this article, ecocentrism and biocentrism will be used interchangeably.

Honestly, I think this is maybe a bit extreme, but I think earth and the environment is more important than humanity.

One theory that explains the consistency of participants' beliefs under this scale comes from Kahn's (1999) research on human relationship with nature. Kahn's research found out that children living in the Amazonian jungle, like kids growing up in urban areas in the US, reasoned about environmental dilemmas from anthropocentric perspectives. This finding led him to hypothesize that the adoption of anthropocentric vs. ecocentric attitudes are mostly determined by developmental levels, and is not constructed culturally through interactions with the natural environment. Similarly, it is not surprising to find endorsement of anthropocentrism or ecocentrism independently of cultural backgrounds among my participants, as all interviewees were college students who are likely at similar developmental levels.

Another explanation originates from understanding the interplay between cultural constructs and the discourse of globalization. Several researchers suggest that beliefs prevailing in Chinese and US societies are converging despite the fundamental difference in ideologies between these two cultures (Deng, 2006; Khan, 2012). Even though Western countries historically believed that humans dominate nature, they have witnessed an increase in environmental awareness as indicated by multiple studies (Deng, 2006; Dunlap & Van Liere, 1978). In contrast, traditional philosophies in China, such as Buddhism and Taoism, were built upon ecocentric ideologies, as they advocate for a harmonic relationship between nature and humans. However, research suggests that this traditional Chinese worldview of nature has diminished with the course of

industrialization and modernization (Deng, 2006). Even though this philosophical tradition has been integrated into the national cultures in the form of public propaganda, it presents a rather elusive and vague concept to the general public. One Chinese student described in this way:

[I think people believe] that people and nature should co-exist in harmony, since this [“people and nature should co-exist in harmony”] is written everywhere.

Eden (1993) claims that governmental or institutional advertisements promoting pro-environmental attitudes or behaviors may not contribute to developing a strong sense of environmental responsibility or a clear direction of actions to take. Instead, it frames the public to think in certain patterns and to “get used to” the thoughts without ascribing them with much meaning. This is exemplified by one Chinese participant’s quotation when he portrayed environmental mindset as “common sense”:

I think people see human-nature relationships as interdependent. I think only people who are really ignorant will think that people are the masters of nature. At least people understand the interdependent relationship between humans and nature through watching television or public service commercials.

This particular participant then commented, “so people understand the principles, but they don't put the principles into practice,” which echoes Eden’s (1993) theory that public propaganda of environmental beliefs does not empower individuals to take pro-environmental actions. The sources of US participants’ ecocentric beliefs are hard to

identify based on the qualitative data. However, the discussion from the former section suggests that their childhood memories allowed them to develop a deep appreciation towards nature, which could explain their discovery of nature's inner beauty. To summarize, although the quantitative results indicate that both Chinese and US participants recognized the intrinsic values of the biosphere, Chinese participants may be less likely to take pro-environmental actions from the consideration of the ecosystem because ecocentric beliefs remain abstract and conceptual for them.

3.3 Human utilization of nature

The purpose of this scale is to see how participants respond between the values of economic development and those of environmental protection. Even though the difference is not quite significant ($p = 0.08$; Table 3), the relatively low probability with such a small sample size implies a likely attitudinal discrepancy between Chinese and US participants. The mean values (Table 3) indicate that Chinese participants are generally more pro-economic development than US participants. To further gauge participants' view on the interplay between economics and the environment, I focused on the responses of the interview questions "have you noticed any physical change in the environment where you grew up?" and "how do you feel about those changes?" The majority (75%) of the Chinese participants discussed significant developments in their hometown, while only two US participants indicated that they noticed major physical changes due to development. However, Chinese participants tended to talk about local and national developments in a positive tone, whereas the two US participants expressed

a sense of frustration when addressing developments. Quotations from one Chinese participant and one US participant are compared below:

I feel really happy for [the development in] my hometown. (Chinese participant)

[The changes in my hometown] make me sad. I don't like seeing the development.

It makes me miss what it used to be like. (US participant)

Many Chinese participants recognized the incompatibility of the underlying values between economic development and environmental protection, as one Chinese participant described:

The biggest environmental problem in China comes from the conflict between economic development and environmental protection.

Even though many have realized the destructive impacts of unregulated economic development can have on the environment, Chinese participants perceived it as rather “inevitable.” One of them commented:

I think we need to promote environmental protection under the premise of economic development. That is a tricky problem. In light of the national condition, we need development to guarantee that everyone can feed themselves before taking care of other things.

None of the US participants explicitly compared the importance of economics and the environment. However, a number of them criticized the economic-driven social structure and government, such as the following participant:

A lot of federal land management agencies really prioritize resources and don't put much value in protecting or conserving [nature].

Newman's (2016) meta-analysis indicates that negative impression of government and business is positively correlated to post-material value orientations. Post-materialism is a form of ideology that is expressed through pursuing higher order goals over the concern about physical or security needs (Johnson, 2004). Some studies have also argued that post-material ideology is a function of affluence at the societal level, whereas societies that have less economic power are likely to pursue values that prioritize material basis (Kemmelmeier, 2002). This rationale is reflected in Maslow's (1943) pyramid of needs model, which predicts that individuals will only pursue nonmaterial goals after psychological and safety needs are met. This model is evidenced in Chinese participants' reasoning about economics versus the environment as he noted:

I think the changes are inevitable. But I am also happy to see that people began to pursue spiritual things after the material needs are satisfied.

The fact that the US is a developed country, and China is still developing, implies that ideologies of US participants may resemble post-material values more than Chinese participants. This theory is applicable to this study only because the connection between

pro-environmental attitudes and economic status is a function of the economic development of a society. In other words, an individual's value orientation is significantly structured by the affluence of one's culture, and less to their personal economic status (Kemmelmeier, 2002). Consequently, regardless of affluence levels of Chinese participants, they are more likely to agree with values or endorse political goals that address the economic or political power of China. This understanding is echoed in one of Chinese participants' responses as follows:

Proportionally, the developed countries have more environmentalists. I think the number of environmentalists is related to the development level of a country.

The varied views of the trade-offs between economic development and environmental preservation agree with prior studies, which found postmaterialism as a function of national economic conditions (Kemmelmeier, 2002). In addition, the endorsement of postmaterial values has been examined to be a strong predictor of postmaterial attitudes, which encompass pro-environmental concerns. Even though Chinese participants expressed their concern for the environment, the majority of them still believe economic development is of the nation's top priority. As a result, it's not likely for them to participate in social or political movements to question the economic-driven structure, as they don't perceive such reform as necessary. In opposite, many environmentalists in the US can be found actively involved in protests for the interest of the environment.

3.4 Support for population growth policy

Based on the survey data answers to the scale “support for population growth policies”, Chinese and US participants do not appear to have a pronounced disagreement regarding population growth policy. The mean values indicate that both groups have a neutral attitude toward population control measures as a type of environmental regulation. However, interestingly, Chinese participants and US participants showed divergent views on three statements that carry strong political implications ($p < 0.05$ for items 4, 6 and 10 in Table 3).

Table 3. Item Comparison for Scale “Support for Population Growth Policies”

<i>Scale Item</i>	<i>Chinese</i>	<i>US</i>	<i>P-value</i>
1. We should strive for the goal of ‘zero population growth’.	3.75	4.13	0.54
2. The idea that we should control the population growth is wrong.	3.88	3.13	0.29
3. Families should be encouraged to limit themselves to two children or less.	3.75	3.50	0.62
4. A married couple should have as many children as they wish, as long as they can adequately provide for them.	3.88	2.63	0.01
6. We should never put limits on the number of children a couple can have.	4.13	2.25	0.01
7. People who say overpopulation is a problem are completely incorrect.	3.75	4.00	0.62
8. The world would be better off if the population stopped growing.	3.00	3.63	0.35
9. We would be better off if we dramatically reduced the number of people on the Earth.	3.13	3.25	0.83
10. The government has no right to require married couples to limit the number of children they can have.	3.75	2.25	0.02

Note: All questions in the scale have homogeneity of variance.

To understand why Chinese participants have stronger reaction to these three statements, one can look at China's one-child policy. This population planning policy was introduced in China in 1979, and it was recently revised in 2015 by allowing a second child per family. I was unable to find literature regarding the public perception of this policy because it is a politically sensitive topic in China. However, as a Chinese citizen born under the execution of the one-child policy, I can relate my personal feelings towards the effects of this policy. My generation has been called the "lonely generation" because most of us do not have siblings. However, the policy seemed perfectly natural to me because I am defined within its framework, and so are my peers who responded to this survey.

I remember asking my parents if I could have a little sister, and they simply told me "the government won't let us." At first, I thought "lonely" just meant I that I would not have a friend who shares my surname and same parents with me. I couldn't fathom this "loneliness" until I noticed that people's feelings of frustration and anger towards this policy were silenced. I couldn't fathom this "loneliness" until I discovered my inability to voice my questions about this policy's implications on human rights. This loneliness is not just shadowing my generation; it is shadowing the whole nation. The sense of "powerlessness" is intertwined with the social structure of China. The economic development path in China has been constructed largely based on mandated government initiatives. The one-child policy is just one example of legislation where the Chinese government has taken the control.

As discussed above, responsible behaviors are stimulated by an internal locus of control, where individuals believe they can make changes in their society. When the actions of governments convince people that they do not have control, it can stifle an internal locus of control to develop or make people more aware of the problem to promote the internal locus of control. In this case, the lived policy and its effects make it less surprising that Chinese participants hold more disapproving attitudes towards population control measures after knowing and experiencing the sense of “powerlessness.”

4. Situational factors

Environmental problems are perceived differently across cultures, not only because of psychological variance, but also because of structural diversity. In Hines' (1987) model of responsible environmental behavior, “situational factors” are evaluated as a determinant for pro-environmental actions to take place. Closely associated with attitudinal and psychological variables, contextual attributes have enabling and constraining influences on one's intention and determination to act. Studies have focused on a variety of aspects of situational factors, which include, but are not limited to economic constraints, social pressures, and opportunities to act. For example, Johnson (2004) indicates that pro-environmental beliefs and actions are a function of a society's affluence. Kennedy et al. (2009) claim that the quality and availability of community environmental services play a major role in initiating pro-environmental behavior. Several subsets of contextual factors have been addressed throughout this study, such as differences between the Chinese and US media, and characteristics related to differences

between “developed” and “developing” countries. This section will address contextual differences between China and the US that have not been discussed previously, and will focus on cultural perception of environmentalism and the visible haze from air pollution.

4.1 Cultural perception of environmentalism

Social perception of environmentalism can directly influence one’s intention to act, and hence determine behavior. Theories suggest that a perceived mismatch between personal behavior and social norms will likely cause feelings of guilt, which are defined as a “painful feeling of regret that is aroused when the actor actually causes, anticipates causing, or is associated with an aversive event” (Ferguson & Stegge, 1998, 20).

Likewise, social norms contribute to one’s perception of moral norms; conduct that fits into social norms will be approved and encouraged by oneself and one’s social group affiliation (Bamberg & Moser, 2007). One Chinese participant described the moral sense as motives to pursue environmental path:

I feel that environmental jobs are very noble. I feel like choosing this profession will get appreciation and approval from the others.

Many Chinese participants tended to evaluate pro-environmental behaviors from a moral standard, as exemplified in the following quotation:

I think the practice of environmental protection is related to a social definition of morality. Behaviors like littering and spitting are not [socially approved] and can cause negative impacts on the environment.

The moral sense of behaving environmentally is also found among US participants. However, instead of emphasizing the “others,” most US participants indicated that their pro-environmental behaviors are initiated by an intrinsic care for the environment.

So, I guess it makes me feel good to try to limit my impacts on the environment, and just being out in nature is something that gives me fulfillments and happiness.

This finding is consistent with my prior discussion about the ecocentric beliefs held by the US participants. One US participant did mention their social perception of responsible environmental behavior:

A decent amount of people would like to see themselves as people who care for the environment, who aren't outwardly against the environment. [Being outwardly against the environment] is something unpopular to be in these days.

As noted above, morality is addressed repetitively by Chinese participants in their reasoning about environmental issues. One explanation originates from the cultural attributes between these two countries. Chinese culture values collectivism and altruism whereas the US culture focuses on individualism and competition. Social-altruistic concerns can result in feelings of guilt when negative consequences to other people are perceived (Schultz & Zelezny, 1999). That being said, irresponsible environmental behaviors can be viewed as “unpleasant” or “inconvenient” for the others, such as littering or spitting. As a result, when altruistic ideologies are valued, the consideration

for others can incentivize one to behave environmentally friendly. However, the effects of many behaviors on the environment are not readily apparent, and victims are not easily identified, resulting in difficulty for one to rationalize the implications of their behaviors (Schultz & Zelezny, 1999). Therefore, even though altruism plays a role in explaining environmental beliefs, the relationship between altruistic values and pro-environmental behaviors are much more complex.

4.2 The haze

A cross-national study conducted in Japan and the US (cite) claims that the expression of environmental concerns is mediated by the social perception and experience of environmental problems. In the US, environmentalists are primarily concerned with the preservation of the environment in its natural state. In contrast, Japanese environmentalism is more “victim” oriented, as a result of perceived or experienced negative consequences of human’s impacts on the environment (Pierce, Lovirch, & Tsurutani, 1987). The environmental situation in China mirrors the case in Japan since China has been vastly and severely affected by its industrial pollution, which is known as “the haze.” Every Chinese participant discussed the severity of the haze, which they believe has significantly raised public’s environmental awareness:

In recent years, the haze is a threat to the entire country and its people. It is not a local problem any more; it is a regional and national problem. That being said, Chinese people are being exposed to pollution more directly, and hence get to know more and more about the pollution.

Another Chinese participant provided an even more concerning narrative of the haze which, she believes, has health-threatening effects on people:

Now people do care about environment in China, mainly because of the haze. Everybody can physically feel it. It's very uncomfortable. I think people care about the environment when it is affecting their lives. Therefore, I would say currently Chinese people do care about environment.

As environmental issues function as a stimulus for the public to take environmental actions, the perceived health risk of environmental pollution can further intensify environmental concerns and strengthen victims' determination to act. Research suggests that higher level of pollution concern for personal and family health can result in stronger victim identification (Bickerstaff & Walker, 2001). Thus, it is likely that Chinese citizens in general find environmental problems more relevant than US citizens and feel the urgent need to tackle those issues.

CONCLUSION

To address the original research concern, this study examined the similarities and differences in environmental knowledge, attitudes and cultural contexts between Chinese and US college students. Consistent with expectations, the attitudinal differences of environmental beliefs are grounded into social structures and cultural practices and can further predict environmental behavioral tendencies and patterns. The results of this paper show that, in comparison with US participants, Chinese participants in general showed

fewer dispositions to take pro-environmental actions because of their perceived low self-efficacy. The lacking of self-efficacy of Chinese participants, also defined as internal locus of control, is found as a function of inadequate environmental action knowledge, environmental sensitivity at minimum level, and socioeconomic factors. The study also finds out that cultural perception of environmentalism and the haze have served as stimulus for Chinese participants to participate in environmental movements. This research find evidence of the role of developmental stages in constructing environmental beliefs. However, further analyses of participants' reasoning are required in order to eliminate external factors and to fully understand how developmental levels are associated with environmental thinking.

It is evident in this study that both Chinese and US participants care about the environment. However, a number of studies claim that the level of concern does not directly translate into engagement with environmental activities (Deng, 2006). The results of this study can help environmental educators develop a better understanding of the implications of cultural backgrounds on environmental values and attitudes, and hence to promote the efficacy of educational practices internationally. In the US, environmental education has been gradually introduced into its education system while it is still marginalized in the education sector in China (Tian, 2016). Therefore, it is of imperative need to generalize green education in China - especially for younger generation to develop a sense of ownership and sensitivity towards nature.

Several limitations should be considered in this research. First, the evaluation of environmental knowledge is only comprised of ten questions and may not accurately reflect participants' actual knowledge level. Second, there might be perceptual variances regarding the understanding of responsible environmental behaviors between Chinese and US participants, which could be originated from cultural traits. Third, because of data limitation, this study does not represent the diversity among US college students.

Appendix 1.

Questionnaire

The questionnaire consists of 50 questions in total to assess your environmental knowledge and environmental attitudes. Please complete the questionnaire one week after receiving it. The total time required to complete the questionnaire should be less than 20 minutes; each part should take less than 10 minutes. You don't have to finish all the questions all at once, but use your first judgment. Please do not search for help on the Internet.

I. Environmental Knowledge – highlight the answer that seems right to you!

1. There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? Is it...

- a. Multiplicity
- b. Biodiversity
- c. Socio-economics
- d. Evolution?
- Don't know

2. Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? Is it...

- a. Factories and businesses
- b. People breathing
- c. Motor vehicles, or
- d. Trees?
- Don't know

3. How is most of the electricity in the U.S. generated? Is it...

- a. By burning oil, coal, and wood
- b. With nuclear power
- c. Through solar energy
- d. At hydro-electric power plants?
- Don't know

4. Which of the following is a renewable resource? Is it...

- a. Oil
- b. Iron ore
- c. Trees, or
- d. Coal
- Don't know

5. Ozone forms a protective layer in the earth's upper atmosphere. What does ozone protect us from? Is it ...

- a. Acid rain
- b. Global warming
- c. Sudden changes in temperature, or
- d. Harmful, cancer-causing sunlight?
- Don't know

6. Greenhouse gasses can contribute to climate change by absorbing:

- a. Visible light
- b. Ultraviolet light
- c. Infrared light

- d. Gamma rays
- Don't know

7. Which of the following household wastes is considered hazardous waste? Is it...

- a. Plastic packaging
- b. Glass
- c. Batteries, or
- d. Spoiled food?
- Don't know

8. What is the most common reason that an animal species becomes extinct? Is it because...

- a. Pesticides are killing them
- b. Their habitats are being destroyed by human
- c. There is too much hunting, or
- d. There are climate changes that affect them?
- Don't know

9. Scientists have not determined the best solution for disposing of nuclear waste. In the U.S., what do we do with it now? Do we...

- a. Use it as nuclear fuel
- b. Sell it to other countries
- c. Dump it in landfills, or
- d. Store and monitor the waste?
- Don't know

10. The technique of conventional farming (industrial farming) is under hot debate in recent years. Please list as least 3 problems that relates to conventional farming below

II. Environmental Values and Attitudes

The following questions are designed to assess your environmental values and attitudes. The questions are divided into four parts, with each part focusing on different value orientations. You should put the letter 'x' under the number that best represents your stance on each statement below, using the following ratings:

- 1 – strongly agree
- 2 – somewhat agree
- 3 – neutral/no opinion
- 4 – somewhat disagree
- 5 – strongly disagree

Part A.	1	2	3	4	5
01. I am not the kind of person who loves spending time in wild, untamed wilderness areas.					
02. I really like going on trips into the countryside, for example to forests or fields.					
03. I find it very boring being out in wilderness areas.					
04. Sometimes when I am unhappy, I find comfort in nature.					

05. Being out in nature is a great stress reducer for me.					
06. I would rather spend my weekend in the city than in wilderness areas.					
07. I enjoy spending time in natural settings just for the sake of being out in nature.					
08. I have a sense of well-being in the silence of nature.					
09. I find it more interesting in a shopping mall than out in the forest looking at trees and birds.					
10. I think spending time in nature is boring.					

Part B.					
01. One of the best things about recycling is that it saves money.					
02. The worst thing about the loss of the rain forest is that it will restrict the development of new medicines.					
03. One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports.					
04. Nature is important because of what it can contribute to the pleasure and welfare of humans.					
05. The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.					
06. We should protect the environment for the well being of plants and animals rather than for the welfare of humans.					
07. Human happiness and human reproduction are less important than a healthy planet.					
08. Conservation is important even if it lowers peoples' standard of living.					
09. We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.					
10. We should protect the environment even if it means peoples' welfare will suffer.					

Part C.					
01. It is all right for humans to use nature as a resource for economic purposes.					
02. Protecting peoples' jobs is more important than protecting the environment.					
03. Humans do not have the right to damage the environment just to get greater economic growth.					
04. People have been giving far too little attention to how human progress has been damaging the environment.					
05. Protecting the environment is more important than protecting economic growth.					
06. We should no longer use nature as a resource for economic purposes.					
07. Protecting the environment is more important than protecting peoples' jobs.					
08. In order to protect the environment, we need economic growth.					
09. The question of the environment is secondary to economic growth.					
10. The benefits of modern consumer products are more important than the pollution that results from their production and use.					

Part D.					
01. We should strive for the goal of "zero population growth".					
02. The idea that we should control the population growth is wrong.					
03. Families should be encouraged to limit themselves to two children or less					

04. A married couple should have as many children as they wish, as long as they can adequately provide for them.					
05. Our government should educate people concerning the importance of having two children or less					
06. We should never put limits on the number of children a couple can have.					
07. People who say overpopulation is a problem are completely incorrect.					
08. The world would be better off if the population stopped growing.					
09. We would be better off if we dramatically reduced the number of people on the Earth.					
10. The government has no right to require married couples to limit the number of children they can have.					

Appendix 2.

Interview Questions

1. How do you define an environmentalist? Do you consider most people in your country to be environmentalists? How about yourself? Why or why not?
2. Have you done anything or do you currently do anything that you consider to be good, bad and/or neutral for the environment?
3. Do you think people in your country care a lot about the environment? How much? Why?
4. How do you think people in your country define their relationship with nature? How do you define your relationship with nature? Do you find any value in this relationship?
5. What do you think is the biggest environmental problem that people in your country face?
6. What do you think most people in the US/China think the biggest environmental problem is?
7. What kind of solution do you think the public will suggest tackling the biggest environmental problem?
8. Have you noticed any changes in the physical environment where you grew up? How do you feel about those changes?
9. Can you identify the first experience in your life that led you to be involved with environmental issues? If yes, please explain.
10. Are there any additional experiences that led you to be involved with environmental issues?
11. Does your family feel the same way about the environment as you do? Do you think they will agree with your identification of the biggest environmental problem you mentioned above?
12. Do your friends feel the same way about the environment as you do?
13. Do your friends exhibit behaviors that show they are environmentally motivated? If yes, what are some examples?
14. Have you taken any courses relating to the environment before attending college?

Citations

Carson, R. L. (1962). *Silent spring*. London: Hamish Hamilton.

Leopold, A (1949). *The Land Ethic*. New York: Oxford University Press.

Johnson, C. Y., Bowker, J. M., & Cordell, H. K. (2004). Ethnic Variation in Environmental Belief and Behavior: An Examination of the New Ecological Paradigm in a Social Psychological Context. *Environment & Behavior*,36(2), 157-186.

Vining, J., Merrick, M.S., & Price, E.A. (2008). The distinction between humans and nature: Human perceptions of connectedness to nature and elements of the natural and unnatural. *Research in Human Ecology*, 15, 1-11.

Zaradic, P. A., Pergams, O. R. W., (2007). Videophilia: Implications for childhood development and conservation. *The Journal of Developmental Processes*, 2(1), 130-147.

Sivek, D. J., & Hungerford, H. (1990). Predictors of Responsible Behavior in Members of Three Wisconsin Conservation Organizations. *The Journal of Environmental Education*,21(2), 35-40.

Dunlap, R. E.,& Mertig, A.G. (1995). Global concern for the environment: Is affluence a prerequisite? *Journal of Social Issues*, 51, 121-137.

Deng, J. (2006). A Comparison of Environmental Values and Attitudes Between Chinese in Canada and Anglo-Canadians. *Environment and Behavior*, 38(1), 22-47.

Hungerford, H. R., & Volk, T. L. (1990). Changing Learner Behavior Through Environmental Education. *The Journal of Environmental Education*,21(3), 8-21.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis. *The Journal of Environmental Education*,18(2), 1-8.

Khan, A., Khan, D. M., & Adil, M. (2012). Refinement And Validation Of New Environmental Paradigm (Nep) In India: A Cfa Approach. *Paradigm*,16(1), 39-50.

Rauwald, K. S., & Moore, C. F. (2002). Environmental Attitudes as Predictors of Policy Support across Three Countries. *Environment and Behavior*,34(6), 709-739.

Yuan, X., & Zuo, J. (2013). A critical assessment of the Higher Education For Sustainable Development from students' perspectives – a Chinese study. *Journal of Cleaner Production* ,48, 108-115.

Wright, T. (2002). Definitions and frameworks for environmental sustainability in higher education. *Higher Education Policy*,15(2), 105-120.

- Eden, S. E. (1993). Individual Environmental Responsibility and its Role in Public Environmentalism. *Environment and Planning A*,25(12), 1743-1758.
- Eckersley, R. (1989). Green politics and the new class: selfishness or virtue? *Policy Studies* (37), 205-223.
- Chawla, L. (1999). Life Paths Into Effective Environmental Action. *The Journal of Environmental Education*,31(1), 15-26.
- Tian, Y., & Wang, C. (2015). Environmental Education in China: Development, Difficulties and Recommendations. *Journal of Social Science Studies*,3(1), 31.
- Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*,17(3-4), 445-459.
- Davis, J. L., Le, B., & Coy, A. E. (2011). Building a model of commitment to the natural environment to predict ecological behavior and willingness to sacrifice. *Journal of Environmental Psychology*,31(3), 257-265.
- Ignatow, G. (2006). Cultural Models of Nature and Society: Reconsidering Environmental Attitudes and Concern. *Environment and Behavior*,38(4), 441-461.
- Bao, X. 2011. "Zhongguo Wei Zhongshi Huanjing Jiaoyu [Environmental Education Needs to Be Gained More Attention in China]." *Nan Fang Zhou Mo*. Accessed April 15, 2012.
- Strife, S., and L. Downey. 2009. "Childhood Development and Access to Nature: A New Direction for Environmental Inequality Research." *Organization & Environment* 22 (1): 99-122.
- Kellert, S. 2002. "Experiencing Nature: Affective, Cognitive, and Evaluative Development in Children." In *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations*, edited by P. Kahn and S. Kellert, 117-151. Cambridge, MA: MIT Press.
- Vicente-Molina, M. A., Fernández-Sáinz, A., & Izagirre-Olaizola, J. (2013). Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. *Journal of Cleaner Production*,61, 130-138.
- Martinez, P.A., Alonso, E. & Martin, M.A. (2008). Environmental economic, political and ethical integration in a common decision-making framework. *Journal of Environmental Management*, 88(1), 154-164.

Pierce, J. C., Lovirch, N. P., Tsurutani, T., & Abe, T. (1987). Environmental belief systems among Japanese and American elites and publics. *Political Behavior*, 9(2), 139-159.

Kahn, P. H. (1999). *The human relationship with nature: Development and culture*. MIT Press.

Bickerstaff, K., & Walker, G. (2001). Public understandings of air pollution: the 'localisation' of environmental risk. *Global Environmental Change*, 11(2), 133-145.

Dunlap, R. E., and K. D. Van Liere. 1978. "The New Environmental Paradigm." *The Journal of Environmental Education* 9 (4): 10-19.

Schultz, P. W., & Stone, W. F. (1994). Authoritarianism and attitudes toward the environment. *Environment and Behavior*, 26, 25-37.

Schultz, P.W., & Zelezny, L.C. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology*, 19, 255-265.