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Ethical Ideology and Public Attitudes Towards Marine Life in China

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Abstract

This study investigates public attitudes in Chinese society towards marine life and determines the roles of basic demographics and ethical ideology in shaping these attitudes. An online survey was conducted in 22 mainland coastal cities on the basis of a questionnaire regarding demographical information, the Ethical Position Questionnaire (EPQ), and an adapted marine life version of the Animal Attitude Scale (AAS). Results demonstrate that Chinese women are more concerned about marine life protection than men. Ethical idealism has positive effects while ethical relativism has negative effects on public attitudes towards marine life. Chinese citizens consider using marine life for food as acceptable, but less acceptable to use their skin or fur. Moreover, ethical ideology is found to have no influence upon public attitudes towards using marine life in medical experiments.

Keywords

marine life – public attitudes – ethical ideology – gender difference – China

Human behavior towards the nonhuman world originates in human attitudes. Understanding human attitudes has therefore been recognized as pivotal to facilitate healthy interactions between the human and nonhuman world to deal

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with issues such as biodiversity loss, wildlife conservation, and animal welfare (Su & Martens, 2017; Gkargkavouzi et al., 2019). To foster sustainable development, an increasing body of research is therefore evolving on public attitudes towards nonhuman animals (Martens et al., 2016). Scholars have established a relation between animal attitudes and human demographics such as gender (Pifer et al., 1994; Su & Martens, 2018), age (Kellert, 1999; Kavanagh et al., 2013), socioeconomic status (Signal & Taylor, 2006), educational background (Ascione & Weber, 1996; Furnham et al., 2003), companion animal ownership (Driscoll, 1992; Martens et al., 2016), religion (Driscoll, 1992; Gilhus, 2006), as well as geographic region (Phillips et al., 2012; Pifer et al., 1994). Social scientists are also increasingly linking public attitudes towards animals with moral positions (Galvin & Herzog, 1992; Taylor & Signal, 2005; Wuensch et al., 2002).

As marine life is under increasing pressure (McCauley et al., 2015), growing scientific attention has been drawn to this area. Some studies have focused on specific species, such as sharks (Lee et al., 2016; Neff & Yang, 2013), sea turtles (Braga & Schiavetti, 2013; Dimopoulos & Pantis, 2003), and dolphins (Barney et al., 2005), while other studies investigated marine life in its entirety (Arnold, 2004; Giglio et al., 2015). Only a few studies have shed light on the demographic factors that influence public attitudes towards marine life. Researchers found that public awareness of marine life is related to factors such as gender (Halkos & Matsiori, 2017; Kidd & Kidd, 1998), age (Kidd & Kidd, 1998), education (Braga & Schiavetti, 2013; Hayes et al., 2015), work occupation (Hoehn & Thapa, 2009), residential location (Arnold, 2004; Kellert, 1999), socioeconomic characteristics (Halkos & Matsiori, 2017), and companion animal ownership (Kidd & Kidd, 1997). Most studies have been restricted to the geographical locations of South and North America (Hoehn & Thapa, 2009; Kidd & Kidd, 1997), Europe (Freeman et al., 2012; Gkargkavouzi et al., 2019; Halkos & Matsiori, 2017), and African countries (Neff & Yang, 2013). Only a limited number of studies have been performed for Eastern Asian countries, however.

Given that so far, no studies have been performed on the relationship between ethical ideology and public attitudes towards marine life, and that very few have been performed on public attitudes towards marine life in Eastern Asian countries, this study aims to fill that knowledge gap. In particular, this study investigates public attitudes in Chinese society towards marine life and determines the roles of basic human demographics and ethical ideology in shaping this attitude. An online survey was conducted in 22 mainland coastal cities based on a questionnaire regarding demographical information, the Ethical Position Questionnaire (EPQ), and an adapted marine life version of the Animal Attitude Scale (AAS).

Methods

Study Areas

We chose 22 mainland coastal cities (administrative areas that include both urban and surrounding rural areas) for probing public attitudes towards marine life in contemporary Chinese society. The main reason for concentrating solely on coastal cities is two-fold: first, citizens in coastal cities are expected to be more familiar with the sea and therefore have better articulated opinions than people living in other regions (Arnold, 2004; Halkos & Matsiori, 2017). Second, a wide variety of former marine life perception studies have been performed for seaside areas (Neff & Yang, 2013; Barney et al., 2005), facilitating comparison. The 22 mainland coastal cities are: Dalian, Yingkou, Qinhuangdao, Tianjin, Yantai, Weihai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Xiamen, Shantou, Guangzhou, Shenzhen, Zhuhai, Zhanjiang, Beihai, Haikou and Sanya. These cities are all located geographically off the coast, hold well-conditioned harbors, and are well suitable for overseas trade and communication. These advantages make them perfect locations for investigating Chinese maritime attitudes. Together, residents in these 22 coastal cities offer a good representation of contemporary Chinese society.

Measures

The online survey was conducted in the target cities from September 17, 2018 to October 8, 2018, and consists of three parts.

In the first part, we requested only demographical information, such as age, gender, city, residential area, educational background, occupation, social economic status, and religious beliefs. Moreover, questions were included regarding living habits such as dietary preference, aquarium and beach visiting frequency.

In the second part, we used the Ethical Position Questionnaire (EPQ) to gauge personal moral ideology. Many studies have made use of the EPQ, first developed by Forsyth (1980), to distinguish between different ethical ideologies. This questionnaire helps to position different ethical opinions relative to two dimensions: *relativism* and *idealism*. Relativism stands for the degree to which individuals question if universal moral principles exist; idealism stands for the degree to which individuals believe that following moral rules lead to the right consequences (Forsyth, 1992; Forsyth & Pope, 1984). A high score for relativism represents the rejection of universal moral principles, while for idealism it signifies a belief that ethical behavior always leads to good results (Galvin & Herzog, 1992). The EPQ is a 20-item Likert scale rated from one to

nine, indicating attitudes from "completely disagree" to "completely agree" (Forsyth, 1984). Participants were asked to self-report how much they approved or disapproved with the statements. Mean scores from idealism and relativism serve as two cut-off values to classify citizens into four ethical groups: situationists (high idealism and high relativism), absolutists (high idealism and low relativism), subjectivists (low idealism and high relativism), and exceptionists (low idealism and low relativism) (Su & Martens, 2017). The efficacy of the EPQ has been authenticated in various countries (Cui et al., 2005). The EPQ therefore enables us to test whether differences in ethical ideologies contribute to differences in attitudes towards marine life.

In the third part, we used an adopted and revised Animal Attitude Scale (AAS); one of the most frequently applied scales in the field of human-nonhuman relationship studies. Its psychometric properties and internal consistency have been validated by various researchers (Herzog et al., 1991). Since marine life is a subcategory of animals, using AAS to test marine life attitude does not undermine its validity. The original Animal Attitude Scale (AAS) is a 5-point Likert scale generated for testing human-animal relationships (Herzog et al., 2015). It consists of 20 articles that require grading from "strongly disagree" to "strongly agree" (Herzog et al., 2015; Taylor & Signal, 2005). We created a marine life version of the AAS by adapting the original, focusing on marine life and maritime activities rather than general animals and human behavior, and without altering the original meaning or themes. When necessary, examples of marine life were given to help clarify the statement in our questionnaire. Following the original AAS, most sentences are scored from 1 (strongly disagree) to 5 (strongly agree), while reversed statements are scored the other way around (Herzog et al., 2015). Therefore, higher marks on our marine life AAS denote a greater concern (Signal & Taylor, 2006) for marine life protection. An example of this adapted scale included the statement, "Basically, humans have the right to use marine life as we see fit." Furthermore, we gave special attention to five of the subtopics of AAS intended to assess attitudes towards different purposes of using marine life (Herzog et al., 2015), including food, medical research, hunting/fishing, skin/fur, and commercial slaughter.

Procedure and Participants

Our online survey was performed by Kurundata, a certified data company which has supported a series of online research projects. In Kurundata's internal panel, residents aged below 18 years old or were not living in one of the 22 coastal cities were screened out. By means of stratified random sampling (Acharya et al., 2013), the system randomly selected target respondents in each city and sent them an invitation to our online questionnaire. The participants were informed that all the information they provided would be kept

confidential and would only be used for scientific purposes. Respondents filled in this questionnaire based upon their own judgements and preferences. A total of 500 valid responses were collected from 1,459 distributed questionnaires. With a mean age of 29.6 years (SD = 7.6), our research sample is comprised of 59% female and 41% male respondents that live in coastal areas of mainland China.

Statistical Analysis

We imported and analyzed the data in IBM SPSS 25 software. The statistics in this project were either normally distributed or could be normalized through Blom's formula (Philliphs et al., 2012). Only data in two AAS subtopics (skin/fur and commercial slaughter) could not be normalized by this formula or by logarithmic method. We still treat them as normally distributed, as existing academic works justify their validity in a large (over 500) dataset (Lumley et al., 2002). Various statistical methods and tests were applied to explore public attitudes towards marine life. First of all, descriptive analyses were performed to capture the fundamental attributes of the sample. Reversed questions in the marine life version of the AAS were also conversely coded before calculating their values. Several mean comparison tests were then performed to assess differences on attitudes towards marine life. Independent samples *t*-tests (with Levene's test for equality of variance), paired samples *t*-tests and one-way ANOVA (with test of homogeneity of variance) were performed according to different variable types. Noting that Type I errors may have had an effect on our results, we introduced Bonferroni correction for multiple comparisons. Moreover, the Pearson correlation test was carried out to obtain more details about how demographics could influence attitudes towards marine life. In addition, we applied simultaneous linear regression to explore the predictors of marine life attitude. Being aware of the possible mutual effect from variables, the interaction between age and gender, idealism, and relativism were also adopted into regression analysis. Besides, a simple effect or simple slope test would be followed up if a mutual effect were testified. An alpha value of 0.05 was consistently employed during the whole analysis process, in which any non-explanatory variable would not be taken into consideration (McDonald, 2009).

Results

Human Demographics

In general, our respondents were relatively young: 64.4% were between 18 and 30 years old, 28.8% between 31 and 40 years old, and only 6.8% 41 years old or above. Sixty percent of our valid responses came from South China and 40%

from North China, separated by the Qingling-Huaihe Line. Urban inhabitants (92.6%) made up the sample majority. That few data came from rural areas (7.4%) may be due to the fact this survey was offered online, since younger people and urban residents have better internet access than seniors or rural residents. In addition to age and location, some other basic features of the participants are displayed in Table 1.

TABLE 1 Basic information of respondents

Items (N=500)	***n*(%)**
Educational background	
Less than high school	2(0.4)
High school	17(3.4)
Junior college program	63(12.6)
University bachelor degree	349(69.8)
Master degree and above	69(13.8)
Occupation	
Liberal Profession	36(7.2)
Civil Servant/Public Institute	85(17)
Employee (Enterprises)	273(54.6)
Self-employed	44(8.8)
Retired	2(0.4)
Student	50(10)
Social Welfare	1(0.2)
Other	3(0.6)
No Answer	6(1.2)
***Average personal income per month* (*rmb/month*)**	
X ≤2,000	10(2.0)
2,000 < X ≤ 4,000	32(6.4)
4,000 < X ≤ 6,000	75(15.0)
6,000 < X ≤ 8,000	105(21.0)
8, 000 < X ≤ 10, 000	129(25.8)
10, 000 < X	143(28.6)
No answer	6(1.2)

TABLE 1 Basic information of respondents (*cont.*)

Items (N=500)	***n*(%)**
Attitude to religion/spirituality	
Important	338(67.6)
Not important	162(32.4)
Companion animal caretaker	
Yes	382(76.4)
No	118(23.6)
Meat (including fish) eating frequency	
Vegetarian/Vegan	12(2.4)
Once a week	43(8.6)
2–3 days a week	100(20.0)
4–6 days a week	237(47.4)
Everyday	108(21.6)
Aquarium/zoo visiting frequency	
Once a month or less than a month	131(26.2)
Once a half-year	196(39.2)
Once a year	99(19.8)
Once two years or more than two years	61(12.2)
Never	13(2.6)
Beach visiting frequency	
Everyday	14(2.8)
Once or twice a week	72(14.4)
Once or twice a month	179(35.8)
Once or twice a half-year	157(31.4)
Once a year	42(8.4)
Once two years or more than two years	36(7.2)
Never	0(0)

The EPQ

In this segment, Cronbach's alpha reached 0.94, implying strong internal consistency of the questions (Taber, 2018). On average, our respondents scored 6.72 (SD = 1.46) on the idealism band and 6.24 (SD = 1.37) for the relativism

band. Dependent on these two cut-off values, situationists accounted for the biggest share of our participants (42.6%), followed by exceptionists (32.6%), absolutists (15.6%), and subjectivists (9.2%).

Marine Life Attitude (*Animal Attitude Scale*) *and Subtopics*

The marine life version of the AAS in our questionnaire obtained a Cronbach's alpha of 0.80, denoting good reliability of this division (Taber, 2018). In the present study, the average marine life AAS score was 64.84 (SD = 7.09) out of 100. This is a little higher than the animal attitude score in Chinese society (M = 63.07, SD = 7.83; Su & Martens, 2017). Despite its initial skewness and kurtosis values implying non-normality, the distribution of AAS-marine life scores reached normality after transforming (as Table 2.1 presented).

Women (M = 65.48, SD = 7.29) scored significantly higher than men (M = 63.91, SD = 6.70) on this scale (t (498) = −2.319, p = .021, d = 0.02). Results also revealed gender was important to marine life attitudes, although the Pearson correlation coefficient (r = .103, p < .05) indicated a weak positive connection. However, we did not find any significant differences across different age groups on marine life attitude. Throughout our dataset, we captured no significant differences between North and South China, educational background, socioeconomic status, and other demographics on marine life attitude. We did observe significant differences between different beach visiting frequencies and marine life attitudes (F (5, 494) = 2.46, p = .032, η^2 = 0.02), while multiple comparisons showed the attitude differences between each group is not significant.

Table 2.2 informs the means and paired comparison results of five selected AAS-marine life subtopics. Due to revising, the "Skin/Fur" subtopic in the present study only includes question 4, rather than 4 and 14 from the original AAS (Herzog et al., 2015). The mean of subtheme "Skin/Fur" is the highest, while "Food" subtheme is the lowest in values. By taking a closer look at the pairwise

TABLE 2.1 Normality test statistics

	N	Skewness		Kurtosis	
		Statistics	*SD*	Statistics	SD
Marine Life Attitude Score	500	0.439	0.109	0.030	0.218
Normalized Score	500	0.003	0.109	−0.074	0.218
Valid N (listwise)	500				

TABLE 2.2 Means and paired comparison results of selected AAS-marine life subtopics

Subtopics	Question number	Mean (*SD*)	Paired comparison *t*/*d* values (*df* = 499, all *p* < .001)			
			Medical research	Hunting/ Fishing	Skin/Fur	Slaughter
Food	6,8,18	2.713(0.707)	−6.749/0.30	−14.834/0.66	−23.001/1.03	−15.676/0.70
Medical Research	2,7,16	2.945(0.641)		−9.229/0.41	−20.878/0.93	−13.469/0.60
Hunting/ Fishing	1,5	3.321(0.708)			−15.089/0.67	−7.474/0.33
Skin/Fur	4	4.03(0.943)				6.052/0.27
Slaughter	10	3.72(1.068)				

comparisons of five AAS-marine life subtopics, we found the score of "Food" to be significantly lower and "Skin/Fur" significantly higher than the other four subtopics. As these subscales are grounded in different quantities of questions, we are hesitant to draw absolute conclusions from pairwise calculations.

Furthermore, we also uncovered some significant differences between human demographics and these subtopics. Men (M = 8.57, SD = 2.06) scored lower on the "Medical Research" subscale than women (M = 9.02, SD = 1.81, t (401) = −2.507, p = .013, d = 0.02). Urban residents (M = 6.68, SD = 1.42) scored higher on "Hunting/Fishing" subtopic than rural residents (M = 6.16, SD = 1.32, t (498) = 2.149, p = .032, d = 0.02). Attitude on the "Food" subtopic is also significantly different among citizens in different occupations (F (8, 491) = 1.985, p = .046, η^2 = 0.03), coastal cities (F (21, 478) = 1.832, p = .014, η^2 = 0.07), and beach visiting frequencies (F (5, 494) = 2.434, p = .034, η^2 = 0.02). Nevertheless, multiple comparisons demonstrated no significant difference between each occupation, coastal city, aquarium, and beach visiting frequency.

Basic Demographics and Ethical Ideology on Marine Life Attitude

As our main research question is whether basic human demographics (such as age and gender) and moral ideology (idealism and relativism) influence public attitudes towards marine life, we took these factors into further examination. Two interactions, age*gender interaction and ethical idealism*ethical relativism interaction, were also taken into consideration as we are interested if mutual effect exist. A simultaneous linear regression analysis indicated that

TABLE 3.1 Influence of basic human demographics and ethical ideology on marine life attitude

AAS-Marine life (df = 6, F = 7.112, R = 0.282)	Unstandardized coefficients		Standardized coefficients beta	t	p
	B	*Std. error*			
Constant	62.353	1.057		58.987	< .001
Gender	1.599	0.634	0.111	2.523	.012
Age	0.229	0.133	0.245	1.727	.085
EPQ Idealism	1.520	0.342	0.314	4.447	< .001
EPQ Relativism	−1.623	0.338	−0.313	−4.795	< .001
Interaction Idealism*Relativism	−0.124	0.113	−0.057	−1.090	.276
Interaction Age*Gender	−0.196	0.082	−0.338	−2.385	.017

gender, idealism, relativism, and age*gender interaction were influential factors on marine life attitude as Table 3.1 shows. Beta coefficients and *t*-values in this table suggest that idealism has a positive correlation with marine life attitude, while relativism correlates negatively.

Regression modeling verified the mutual effect from age and gender on marine life attitude. A two-way ANOVA test was carried out to better describe how age influences different genders on attitudes towards marine life as well as how attitudes from men and women change in different age groups. ANOVA results demonstrated that the influence of age*gender interaction was small while noticeable (F (5, 494) = 6.84, p = .002, η_p^2 = 0.04). Table 3.2 presents the simple effect test outcomes. In the 18–30-year old group, women scored significantly higher than men. There was no attitude difference between men and women in the 31–41-year-old or 41-year-old and above group. Both men and women significantly shifted their attitudes towards marine life when comparing the 31–40-year old group with the 18–30-year old group. Men in the 31–40-year old group obtained a significantly higher grade whereas women in this age group gained a significantly lower grade than their 18–30-year old group equivalents. In contrast, neither men nor women hold significantly different attitudes when comparing to the 41-year old and above group.

The mutual effect from moralities was proved insignificant to attitudes towards marine life. That said, it is still possible to see how much each ethical group score on marine life attitude in China. According to our data, the average scores of four ethical clusters on the AAS marine life version were 64.73 (*SD* =

TABLE 3.2 Influence of basic human demographics and ethical ideology on selected subtopics

Age group	Gender	Mean	*SD*	*n*	Comparison		
18–30	Male	62.97	5.840	110	Male	$F(2,494) = 3.948$	18–30 < 31–40
	Female	66.10	7.606	212		$p = .020$, $\eta_p^2 = 0.02$	($p = .031$)
31–40	Male	65.66	7.648	76	Female	$F(2,494) = 3.147$	18–30 > 31–40
	Female	63.54	6.417	68		$p = .044$, $\eta_p^2 = 0.01$	($p = .038$)
41 ≤	Male	62.32	6.129	19	18–30	$F(1,494) = 13.140$	Male < Female
	Female	65.53	4.749	15		$p < .001$, $\eta_p^2 = 0.03$	($p < .001$)

TABLE 3.3 Influence of basic human demographics and ethical ideology on selected subtopics

Subtopic (*B* / *t*)	Food	Medical research	Hunting/ Fishing	Skin/Fur	Slaughter
Age					
Gender		0.398/2.250*			
EPQ Idealism			0.285/4.109*	0.182/4.036*	0.193/3.755*
EPQ Relativism	−0.408/−3.997*		−0.291/−4.246*		
Interaction I*R				−0.036/−2.416*	
Interaction A*G					

Note: * $p < .05$

7.22) for situationists, 63.59 (*SD* = 6.28) for exceptionists, 68.05 (*SD* = 7.29) for absolutists, and 64.28 (*SD* = 7.39) for subjectivists. Subsequently, we further delved into the research question of whether human demographics and moral ideology are influential to the five selected AAS marine life subtopics. Table 3.3 summarizes the linear regression results of selected subtopics.

According to the outcomes listed in Table 3.3, we recognize that human demographics are less influential than ethical ideology to these different marine life subscales. Gender is only correlated with the subtopic of "Medical Research." Age and the interaction of age and gender have no effect on any subtopic. Conversely, it is apparent that ethical ideology has a pivotal role in nearly all five subtopics. Ethical idealism gained positive beta coefficients and *t*-values on "Hunting/Fishing," "Skin/Fur," and "Commercial Slaughter" subtopics, denoting its positive relation to public attitudes towards using these marine life categories. Ethical relativism had negative beta coefficients and *t*-values on

TABLE 4 Other important variables to marine life attitudes

AAS-Marine life (df = 6, F = 5.943, R = 0.330)	Unstandardized coefficients		Std.Coefficients beta	t	p
	B	*Std. Error*			
Constant	64.629	0.483		133.851	< .001
City – Wenzhou	9.797	3.470	0.157	2.823	.005
City – Tianjin	3.987	1.675	0.132	2.380	.018
Beach-visiting 1–2 times/week	3.129	1.027	0.173	3.045	.003
Religious Beliefs – Catholicism	−3.702	1.333	−0.157	−2.777	.006
Occupation – Liberal Profession	−4.207	1.720	−0.136	−2.447	.015
Caretaker – Rodents	−4.949	2.211	−0.124	−2.238	.026

"Food" and "Hunting/Fishing" subtopics, representing its negative connection with the public perception of utilizing marine life for food and fishing entertainment. The interaction between idealism and relativism turned out to be influential on "Skin/Fur" subtheme. Noticeably, ethical idealism and relativism are both dominant factors in public attitudes towards "Hunting/Fishing." Yet, neither the two ethical orientation nor their interaction is instrumental in the theme of "Medical Research."

Marine Life Attitude and Other Explainable Factors

Apart from gender, there are some other human demographics we found effective in interpreting public attitudes towards marine life. These demographical factors are illustrated in Table 4.

Discussion

This research examined how basic human demographics, such as age, gender, and ethical ideology, influence attitudes in contemporary Chinese society towards marine life. We found that both gender and ethical ideology are important determinants. Women, particularly in younger generations, tend to be more concerned about marine life protection in China. Results from this study enrich our understanding of human-marine life interactions and sustainable human-nonhuman animal relationships.

Marine Life Attitude

Generally, our outcomes suggest that the majority of coastal Chinese citizens have favorable attitudes towards marine life protection. Despite different scales employed to measure public attitudes, it can be concluded that Chinese citizens show similar levels of concern for marine life protection compared to people in other studied countries, such as the United States (Kellert, 1999), Greece (Dimopoulos & Pantis, 2003), Panama (Hoehn & Thapa, 2009), Germany, and Israel (Freeman et al., 2012). A variety of factors may contribute to the favorable attitudes of the Chinese. In civic society, marine environmental NGOs have actively engaged in different kinds of marine life protection activities and gradually enlarged their influence in Chinese society during the past decades (Qiu et al., 2009). Increasing involvement from the central government also plays a critical role. In 2015 and 2017, the central government approved "Action Plan for Preventing and Treatment of Water Pollution" and "Action Plan for Preventing and Treatment of Offshore Pollution." Marine environment and biodiversity protection have subsequently become a national strategy. Furthermore, large-scale maritime disasters, such as the Penglai 19–3 Oil Spill, have also deepened public concerns for marine life to a certain degree (Liu et al., 2016).

Many earlier studies have highlighted the gender difference in attitudes towards animals and noticed that women generally are more concerned about animal wellbeing (Herzog et al., 1991; Taylor & Signal, 2005). Our study confirms the same correlation for marine life: compared to men, women are more concerned with marine life and marine life protection. This is especially clear in younger generations (18–30-year old group). Tentative reasons given in the animal research literature are, for example, social-culture context (Hills, 1989), biological urges (Herzog et al., 1991) and different moral orientations (Kellert & Berry 1987). A preceding animal study conducted in China, however, concluded that Chinese men and women equally respect animals as an indispensable part of society (Su & Martens, 2017). This different outcome may have resulted from the fact the two studies concentrated on different areas. As Herzog (2007) pointed out, gender difference in attitudes towards other species differs depending on the type of interaction. Our research centered on attitudes towards marine life in coastal areas. The interaction between human society and marine life is by no means the same with animals in a general sense or in whole mainland China.

Although some literature reports attitude differences between age groups (Kellert, 1999), our research did not capture such age differences in Chinese public attitudes towards marine life. Residents in different age groups exhibited

a relatively similar level of marine life awareness. This differs from the findings of Su and Martens (2017), where elderly populations were observed to be more negative towards animal protection as well as animal welfare. Two factors may explain this phenomenon. Unlike the general case of animals, marine life protection requires the popularization of specialized maritime knowledge (Fletcher et al., 2009). Education about marine life has been largely ignored, however, for the past decades in mainland China. This is also a global issue since low level knowledge regarding marine life has already been observed in different countries (Dimopoulos & Pantis, 2003; Freeman et al., 2012). Now that both the young and the elderly generally have the same information about marine life, it is reasonable to expect that they can be equally concerned about marine life. Moreover, the unevenly distributed research sample may also have played a role here. As stated before, our respondents are relatively young because of the online survey method. The senior group has far fewer samples than the youth group. Therefore, the observed insignificance of difference between age groups might also result from the sample, to a certain degree.

Our analysis also shows a clear link between attitudes towards marine life and the mutual effect of age and gender. Chinese men and women show different attitudes towards marine life dependent on age. As aforementioned, women are usually better aware of animal/marine life protection. Yet in age group 31–40, Chinese women are obviously less concerned about marine life than the 18–30-year group. Interestingly, the opposite change happens to Chinese men. They are more friendly to marine life in age group 31–40 than 18–30. We assume this to be related to the societal context of marriage in China. Over the last years, the marriage age has increased in coastal areas. According to a news report from China Youth Daily (2018), the mean first marriage age (male/female) was 30.3/28.4 in Shanghai (2015), 34.3/34.1 in Jiangsu province (2017) and 28.2/28.4 in Qingdao (2017). Chinese citizens in coastal areas normally marry in their 31–40s. Noting that marital status could influence individual animal attitude (Kafer et al., 1992) as well as lifestyle (Kravdal, 2001), it may be expected that both Chinese men and women change their marine life attitude in the age range 31–40. However, it remains unclear how marriages could specifically contribute to the attitude change towards marine life in China. Further investigations are still needed to better explain how marriages trigger the public attitude change towards marine life. Additionally, contrary to some previous animal studies (Hayes et al., 2015), we report no significant differences between North and South China, educational background, socioeconomic status or other demographic factors on marine life attitude, among our respondents.

Subtopics of Marine Life Attitude

The findings of our study supplement an emerging body of research on the public attitudes towards how we treat marine life. Judging from our respondents' preferences of the five selected subtopics (food; medical research; hunting/fishing; skin/fur; commercial slaughter), we conclude that Chinese citizens have different attitudes towards different marine life practices. It is almost certain using marine life (e.g., fish, shrimps) as food was the most accepted use of marine life for Chinese citizens. Next, using marine life in medical research was found to be acceptable. This also confirms the Chinese animal attitude results found by Su and Martens (2017), which showed that many Chinese consider animal (e.g., rodents) suffering in research experiments to be tolerable. In addition, we found that men are more positive towards using marine life in medical research than women. This may be due to the fact that men are more "thing-oriented" than women (Herzog et al., 1991; Hill, 1989). However, the use of marine life for skin or fur (from seals and sea otters, for example) seemed to be the least acceptable issue for Chinese residents. Aside from the use of skin or fur, respondents were concerned for the commercial slaughter of marine life (whales and dolphins, for example). Together these results suggest that brutalities to marine life (especially for commercial uses) are intolerable to the sampled Chinese population.

Ethical Ideology and Marine Life Attitude

This research also offers new insight in the relationship between ethical ideology and attitudes towards marine life. Recent work has already shown that ethical idealism can considerably affect personal attitudes towards animals (McPhedran, 2009; Su & Martens, 2018). We have substantiated this linkage by filling the knowledge gap concerning marine animals. Our data suggests that ethical idealism is positively correlated with public attitudes towards marine life in Chinese society. The greater respondents believe that good actions will have desirable consequences, the more they value the protection of marine life. First, idealistic morality is intrinsically incorporated in the concept of accomplishing decent outcomes (Forsyth & Pope, 1984). Protecting marine animals and improving their living surroundings, for example, could help marine biodiversity conservation and mitigate biological resources exhaustion. Moreover, Chinese culture has historically been deeply influenced by Buddhist philosophy (Suen et al., 2007). One of the key messages of Buddhism is to protect all sentient beings and to show altruistic behavior towards them (Yao, 2006). Inspired by this philosophy, Chinese idealistic morality favors a friendly attitude towards marine life.

Further analysis of our data brings to light that ethical relativism is an influential predictor of attitudes towards marine life in China. The more that people question the existence of universal moral principles, the less they value marine life protection. This is consistent with research regarding public attitudes towards animals in China, which found ethical relativism to be negatively correlated with attitudes towards animals (Su & Martens, 2017). People with a "relativistic" moral orientation refuse to make judgements relying on universal ethical principles (Forsyth, 1992). Instead, they prefer to act on the grounds of a given context, as well as their own needs. Chinese culture, historically, values instrumentalism and materialism (Lin & Wang, 2010). Following this philosophy, Chinese people would put far more emphasis on the instrumental values of animals (including marine life) than on their intrinsic values. The public are more likely to safeguard fishery resources from exhaustion for the sake of fish consumption rather than caring for fish or their living waters. This could also clarify why using marine life as food triggers the least concern in Chinese society. As our data show, the impact of relativistic morality on marine life attitude is roughly the same with ethical idealism. Both moralities are equally influential in shaping attitude towards marine life in China.

Unsurprisingly, we discovered that both ethical dimensions and their interactions are predictors for most selected marine life attitude subtopics. Idealism is key in public attitudes towards "Hunting/Fishing," "Skin/Fur," and "Commercial Slaughter." In other words, people who believe ethical behavior will only contribute to good consequences do not appear to accept such actions. Relativism is of vital importance for the attitude towards "Food" and "Hunting/Fishing." When seeing the instrumental value of marine life (food or entertainment), people will sacrifice marine life for their own needs. The interaction of two ideologies is valuable to the subtopic "Skin/Fur." We did not expect that neither of the two dimensions nor their interaction would be connected to the "Medical Research" subtopic. Combined with previous research results suggesting that Chinese society has a relatively high tolerance for animal suffering in experiments (Su & Martens, 2017), we believe such tolerance is closely linked to the unique context of contemporary Chinese society. To begin with, the public awareness of animal rights and animal welfare remains at a low level in Chinese society despite that increasing attention has been drawn to these issues in the past decades (Li, 2006). More crucially, although scientific communities have been aware of animal welfare in laboratory use and formulated relevant regulations, implementation is still far from ideal in contemporary Chinese society (Bayne et al., 2015). Thus, a lack of integration and enforcement of animal welfare and scientific research ethics may underlie the acceptance of using marine life in medical research. Following this inadequate

research ethic boundary, the Confucianism and traditional culture may further intensify the tolerance of the scientific use of marine life. Confucianism is the foundation stone of Chinese culture and social norms (Rarick, 2008). Education and knowledge are highly respected and valued in Confucianism (Spring, 2012). The respondents may also simply believe that scientific development far outweighs the welfare of marine life or ending its use in medical studies. Therefore, if pursuing knowledge is the primary goal, research using marine life will likely continue to be acceptable in China.

Other Predictors of Marine Life Attitude

We also found that the species of the Chinese respondents' companion animals (especially rodents), as well as their religious beliefs (especially Catholicism) were two influential factors on attitudes towards marine life. This corresponds to public attitudes towards animals in China found by Su and Martens (2017). Residential city, occupation, and beach visiting frequency are three other indicators of marine life attitude. The former could possibly be the reason for different social contexts in different cities, such as the number and size of aquariums, the popularization of marine life knowledge, and the funding received from local governments. The latter two involve the issue of human interaction. In some occupations (such as liberal professions), people have more time to go to the beach or otherwise connect with marine life.

Conclusion

This study has investigated public attitudes in Chinese society towards marine life and determined the roles of basic demographics and ethical ideology in shaping this attitude. Our results demonstrate that Chinese women are more concerned about marine life protection than men. Ethical idealism is positively correlated with concern about marine life while ethical relativism is negatively correlated. Chinese citizens generally consider using marine life for food acceptable, but less acceptable for using their skin or fur. Ethical ideology is found to have no influence upon public attitudes towards using marine life for testing in medical experiments. Given that this study copes with marine life in a broad sense, future projects are encouraged to pay attention to public attitudes towards specific marine species, such as sharks and dolphins, since few such studies have been performed in the Chinese context.

Our research has several obvious limitations. Because of the online survey method, we did not collect as much data from coastal rural areas and the

elderly as we had anticipated. This partly explains why we did not find any statistically significant differences between urban and rural attitudes from our dataset. Other research methods, such as interviews and focus groups, may in the future ensure a more balanced distribution of participants and thus provide with additional information on Chinese attitudes towards marine life.

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