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Original Research

Gender Differences in Pro-Environmental Behavioral Intentions, Environmental Values, Tolerance of Environmental Protection Cost, and Confidence in Citizen Participation in Environmental Policies During the COVID-19 Pandemic in Taiwan

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Abstract

The present study compared the two genders in regard to Taiwan residents' attitudes on their pro-environmental behavior intentions and other influencing factors related to environmental protection. Data were taken from the Taiwan Social Change Survey (TSCS) of 2020. Descriptive statistics were calculated, and multiple regression models were constructed with pro-environmental behavioral intentions as the dependent variable and demographics and other key factors related to environmental protection attitudes as independent variables to compare the two genders. Women had significantly stronger pro-environmental behavioral intentions and environmental values than men. By contrast, men were more willing to pay much higher taxes to protect the environment, but less willing to reduce living standards. Men were significantly more confident in the availability of opportunities for the general public to influence environmental policies, but women were significantly more confident in the ability of citizens to propose constructive suggestions on environmental protection policies. The present study examined and demonstrated the gender differences in regard to pro-environmental behavioral intentions and environmental protection-related factors among Taiwanese citizens. The study's findings provide insight into how to provide Taiwanese citizens of different genders with proper and targeted attitudes and behaviors from the perspective of environmental protection.

Keywords: gender differences, pro-environmental behavioral intentions, environmental values, tolerance of environmental protection cost, confidence in citizen participation in environmental policies, Taiwan

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Introduction

Generally speaking, people are eager to have an agreeable and healthy lifestyle; environmental conditions are likely to have both direct and indirect effects on people's life satisfaction and health status [1]. Consequently, in order to improve the life satisfaction and health status of citizens, it is necessary to take issues related to environmental protection seriously.

Environmental protection is not just the responsibility of governments or enterprises, but an important responsibility of every citizen as well. Pro-environmental behaviors consist of all possible actions aimed at safeguarding, or at least avoiding harm to the environment, either performed in public (e.g., participation in environmental movements) or private (e.g., i.e. re-use and recycling) [2, 3]. A large number of studies have aimed to discover possible personal (e.g., knowledge and education) and social (e.g., urban-rural differences) factors that influence individuals' pro-environmental behaviors [4-6]. Generally speaking, individuals' pro-environmental behaviors are positively affected by their environmental awareness, environmental concern, and environmental attachment [7, 8]. The COVID-19 pandemic has led to an increase in people's knowledge about the environment, and individuals' positive attitudes toward performing pro-environmental behaviors has also increased [9, 10].

Environmental values are individual or shared (i.e., community or societal) beliefs about the significance, importance, and well-being of the natural environment, and how the natural world should be viewed and treated by humans [11]. Environmental values vary from person to person, and can be divided as four types: biospheric (i.e., concern for the environment), altruistic (i.e., concern for others), egoistic (i.e., concern for personal resources) and hedonic (i.e., concern for pleasure and comfort) [12]. The COVID-19 pandemic has had different effects on individuals' environmental values. On the one hand, one study found that consumers in Latin America reported that their behaviors have become more ecologically and socially responsible as a result of the COVID-19 pandemic [13]; on the other hand, the relative importance of environmental values to Australian adults increased from 2017 to 2019 but decreased during the pandemic [14]. Regional differences may be an influencing factor. Consequently, it is necessary to explore these issues further in other regions.

In order to achieve ideal environmental quality, some cost and sacrifice are likely inevitable. Individuals and enterprises are obliged to undertake higher prices or taxes than before, and to bear a certain level of routine inconvenience [15, 16]. For example, unlike many other countries where large junk-chomping garbage cans are placed in communities, in Taiwan, garbage trucks come once or twice a day and are stationed at a fixed point for a fixed period. In other words, citizens are obliged to follow the schedule of the truck to toss their trash into it. In addition, citizens must sort their trash properly, and not all recyclables are collected daily [17]. However, the willingness to pay for environmental protection or to endure inconvenience differs from person to person [18, 19]. Prior evidence has shown that only a minority of individuals are unwilling to pay an income contribution to improve the quality of the environment because they have an indifferent attitude and insufficient knowledge about environmental issues [20]. The government should, therefore, make an effort to let citizens feel that their efforts really promote their quality of life.

Policy-making has long been regarded as the business of politicians. However, in Taiwan, many NGOs devoted to environmental protection have actively proposed initiatives to different levels of government [21]. In addition, the Taiwanese government at all levels has constructed an online participation platform for public policy that is open to all citizens [22]. Prior studies have indicated that political participation is closely related to life satisfaction, and the life satisfaction of political participants is higher than that of non-political participants [23, 24]. Whether citizens have the energy or time to personally participate in environmental protection activities, governments should let them know that their suggestions are taken seriously into consideration.

Prior studies have explored gender differences in attitudes toward environmental protection. They have identified a gender gap in attitudes toward environmental protection, with the women respondents having a more favourable environmental attitude than men respondents [25, 26]. Some feminist researchers have suggested that this is due to women's traditional roles as caregivers, subsistence food producers, water and fuel wood collectors, and reproducers of human life [27]. Accordingly, based on the gender differences in the attitudes toward environmental protection, governments should propose different and appropriate methods to influence and persuade citizens of different genders.

The COVID-19 pandemic started at the end of 2019 and highlighted the role of environmental cleansing in controlling transmission of infection [28]. The pandemic has also taught the global population to seek ways to incur less damage to the environment [17]. In principle, after suffering from the pandemic, people would be expected to be more conscious of the importance of environmental protection. However, according to the 2022 Environmental Performance Index (EPI), an analysis by Yale and Columbia researchers that provides a data-driven summary of the state of sustainability around the world, Taiwan was ranked 74th among 180 entries [29]. In fact, this overall performance was not satisfactory. What are the attitudes of Taiwanese residents toward environmental protection? One purpose of the present study is to compare pro-environmental behavioral intentions, environmental values, tolerance of environmental protection cost, and confidence in citizen participation in environmental policies

between two genders of Taiwanese citizens using large scale representative data collected by the Institute of Sociology, Academia Sinica, Taiwan. Another of its goals is to separately investigate the associations between the aforementioned variables for the two genders. The study's findings will have implications for the Taiwanese government and organizations that care about environmental protection by helping to create an agreeable environment for health promotion among Taiwanese citizens.

Materials and Methods

Data and Study Design

The dataset that we used for the present study was collected via a research project in Taiwan (i.e., the Taiwan Social Change Survey [TSCS]). The target population of the TSCS was Taiwanese residents (i.e., those recorded in the Department of Household Registration), and the TSCS adopted a stratified random sampling method. Data collection for the TSCS was completely supervised and arranged by the Institute of Sociology, Academia Sinica (Taiwan) [30].

For the 2020 TSCS, in-person interviews were conducted between June 2020 and February 2021 (during the COVID-19 pandemic). The institutional review board (IRB) for Humanities & Social Science Research Academia Sinica (AS-IRB-HS 02-19034[R7]) approved the TSCS data collection. In addition, participants involved in the TSCS data collection were at least 18 years old. The survey was conducted by interviewers through in-person interviews and written informed consent was obtained from the participants. The 2020 TSCS ultimately gathered a sample size of 1839 individuals.

Measures

Pro-Environmental Behavioral Intentions

Three items were rated using a five-point Likert scale from "1 = very unwilling" to "5 = very willing" to assess three different pro-environmental behavioral intentions. The items were, "Are you willing to provide your own shopping bag when shopping outside?", "Are you willing to provide your own tableware (including chopsticks, forks, spoons, etc) when eating outside?", "Are you willing to use a handkerchief instead of facial tissue and hygiene wipes after dining?". All item scores were coded such that a higher score indicated stronger pro-environmental behavior intentions, and the items had good internal consistency ($\alpha = 0.70$). The item scores were then averaged to present an overall pro-environmental behavioral intentions score.

Environmental Values

Three items were used to measure the participants' environmental values : "Live in harmony with nature", "Respect the Earth" (i.e., harmonious coexistence with other species), and "Protect the environment". Participants were asked to rate these items from 0 = very unimportant to 7 = very important to express their importance to their personal lives. All the item scores were coded such that a higher score indicated a higher level of importance attached to the environmental values by participants. The three items were treated independently in the data analysis.

Tolerance of Environmental Protection Cost

Three items were used to assess individuals' tolerance of costs incurred by environmental protection; all were rated on a five-point Likert scale from 1 = very unwilling to 5 = very willing. The items were, "Are you willing to pay much higher prices to protect the environment?" "Are you willing to pay much higher taxes to protect the environment?", and "Are you willing to reduce your living standards to protect the environment?" A higher score indicated a higher level of tolerance of environmental protection cost. The three items were treated independently in the data analysis.

Confidence in Citizen Participation in Environmental Policies

Three items were used to assess the participants' confidence in citizen participation in environmental policies; all were rated on a five-point Likert scale from 1 = totally disagree to 5 = totally agree. The items were, "In Taiwan, the opportunities for the general public to influence environmental protection policies are very limited". "Citizen participation helps improve the quality of environmental protection policies", and "Citizens have the ability to propose constructive suggestions on environmental protection policies." The first item was reverse coded. A higher score indicated a higher level of confidence in citizen participation in environmental policies. The three items were treated independently in the data analysis.

Demographic Variables

In addition to gender, the participants were also asked several questions about their demographic information: age (in years); residency (big urban or other); education (senior high school or below, associate bachelor, bachelor's degree or above); religious belief (yes or no); marital status (single, married, or other including divorced, widowed, cohabiting, etc.); employment status (full-time or other).

Data Analysis

All data were summarized using descriptive statistics (including means, standard deviations, frequencies, and percentages) to portray the performance of the studied variables in the TSCS 2020. The independent samples t test (for continuous data) and $\chi 2$ tests (for categorical data) were used to examine the differences between genders. Two multiple regression models were then constructed for the two genders using parallel variables: the dependent variable was pro-environmental behavioral intentions, while the independent variables were environmental values, tolerance of environmental protection cost, and confidence in citizen participation in environmental policies. All statistical analyses were executed using SPSS (Statistical Product Service Solutions) 27.0.

Results

The respondents' demographic information for the two genders is presented in Table 1. In brief, women, when compared with men (n = 1058 for women; n = 781 for men) were older (51.47 years vs 48.12 years; $p<0.001$) had more residency in big urban areas (31.9% vs 26.7%; $p = 0.015$), were more religious (75.0% vs 68.2%; $p<0.001$), were less educated (30.6% vs 38.4% at the level of bachelor's degree or above; $p = 0.001$), less likely to be full-time employed (47.8% vs 64.0%; $p<0.001$), and less likely to be single (19.1% vs 34.7%).

Table 2 shows the differences between women and men in terms of pro-environmental behavioral intentions, environmental values, tolerance of environmental protection cost, and confidence in citizen participation in environmental policies. As a whole, women showed stronger pro-environmental behavioral intentions than men. Women were more willing to provide themselves with a shopping bag when shopping outside (4.40 vs 4.69; $p<0.001$), to provide themselves with tableware when eating outside (3.82 vs 4.22; $p<0.001$), and to use a handkerchief instead of facial tissue and hygiene wipes after dining (3.13 vs 3.29; $p<0.001$). With regard to environmental values, overall, women expressed stronger environmental values than men. When being asked about the importance of living in harmony with nature (6.04 vs 6.20; $p = 0.004$), respecting the Earth (6.17 vs 6.36; $p<0.001$), or protecting the environment (6.16 vs 6.37; $p<0.001$) to their personal lives, women ranked all of these measures significantly more highly than men.

With regard to tolerance of environmental protection cost, men were more willing than women to pay much higher taxes to protect the environment (2.72 vs 2.58;

Table 1. Demographic Comparisons among Different Genders in 2020 Taiwan Social Change Survey (TSCS).

	Men (n = 781)	Women (n = 1058)	p-value
	M (SD) or n (%)	M (SD) or n (%)	
Age (in years)	48.12 (16.96)	51.47 (16.33)	<0.001
Residency			
Big Urban	207 (26.7%)	336 (31.9%)	0.015
Other	569 (73.3%)	717 (68.1%)	
Educational Level			
Senior high school or below	399 (51.1%)	624 (59.2%)	0.001
Associate degree	82 (10.5%)	107 (10.2%)	
Bachelor's degree or above	300 (38.4%)	323 (30.6%)	
Marital Status			
Single	271 (34.7%)	202 (19.1%)	<0.001
Married	405 (51.9%)	617 (58.5%)	
Other	105 (13.4%)	236 (22.4%)	
Religious Belief			
Yes	532 (68.2%)	793 (75.0%)	0.001
No	248 (31.8%)	265 (25.0%)	
Employment Status			
Full-Time	499 (64.0%)	503 (47.8%)	<0.001
Other	281 (36.0%)	549 (52.2%)	

Table 2. Pro-Environmental Behavioral Intentions, Environmental Values, Tolerance of Environmental Protection Cost, and Confidence in Citizen Participation in Environmental Policies among Different Genders in 2020 Taiwan Social Change Survey (TSCS).

	Men	Women	p-value
	M (SD)	M (SD)	
Pro-Environmental Behavioral Intentions			
Willingness to provide myself with a shopping bag when shopping outside	4.40 (0.91)	4.69 (0.60)	<0.001
Willingness to provide myself with tableware when eating outside	3.82 (1.19)	4.22 (0.98)	<0.001
Willingness to use a handkerchief instead of facial tissue and hygiene wipes after dining	3.13 (1.24)	3.39 (1.24)	<0.001
Environmental Values a			
Live in harmony with nature	6.04 (1.23)	6.20 (1.14)	0.004
Respect the Earth	6.17 (1.23)	6.36 (1.02)	<0.001
Protect the environment	6.16 (1.16)	6.37 (0.96)	<0.001
Tolerance of Environmental Protection Cost			
Willingness to pay much higher prices to protect the environment	2.97 (1.19)	2.89 (1.15)	0.119
Willingness to pay much higher taxes to protect the environment	2.72 (1.17)	2.58 (1.13)	0.008
Willingness to reduce living standards to protect the environment	3.39 (1.10)	3.51 (1.09)	0.027
Confidence in Citizen Participation in Environmental Policies			
The opportunities for the general public to influence environmental protection policies are very limited b	3.61 (0.96)	3.42 (1.01)	<0.001
Citizen participation helps improve the quality of environmental protection policies	4.05 (0.57)	4.08 (0.50)	0.223
Citizens have the ability to propose constructive suggestions on environmental protection policies	3.75 (0.79)	3.82 (0.70)	0.036

Note: a Assessed using a 7 scale. b Reverse coded.

p = 0.008), but men were less willing than women to reduce their living standards to protect the environment than women (3.39 vs 3.51; p = 0.027). With regard to confidence in citizen participation in environmental policies, men were more confident in the opportunities for the general public to influence environmental protection policies than women were (3.61 vs 3.42; p<0.001). By contrast, women were more confident than men that citizens have the ability to propose constructive suggestions on environmental protection policies (3.75 vs 3.82; p = 0.036).

Table 3 and 4 present the results of the multiple regression models. In the men's group, individuals with a bachelor's degree (standardized coefficient (β = 0.117; p = 0.003) had stronger pro-environmental behavioral intentions than those with a high school degree. Individuals who were married had stronger pro-environmental behavioral intentions than those who were single (β = 0.121; p = 0.008). The more individuals valued the importance to their personal lives of living in harmony with nature, the stronger their pro-environmental behavior intentions they had (β = 0.129; p = 0.007).

The more willing the men were to pay much higher prices to protect the environment, the stronger pro-environmental behavior intentions they had (β = 0.189; p = 0.000). The more willing they were to reduce their living standards to protect the environment, the stronger pro-environmental behavior intentions they had (β = 0.184; p = 0.000). The more the men were confident that citizens have the ability to propose constructive suggestions on environmental protection policies, the stronger their pro-environmental behavioral intentions (β = 0.104; p = 0.003).

In the women's group, women with a bachelor's degree had stronger pro-environmental behavior intentions than those with only a high school degree (β = 0.086; p = 0.033). The more the women valued

Table 3. Multiple Linear Regression Model Explaining Men's Pro-Environmental Behavioral Intentions in 2020 Taiwan Social Change Survey (TSCS).

	Men		
	B (SE)	*β (p-value)*	95% CI
Constant	3.838 (.882)		(2.106–5.570)
Age	.006 (.008)	.041 (.402)	(-.008–.021)
Residency (Ref: other)	-.169 (.194)	-.030 (.385)	(-.551–.213)
Educational Level (Ref: <=high school)			
Associate degree	.146 (.286)	.018 (.610)	(-.415–.708)
Bachelor's degree or above	.601 (.203)	.117 (.003)	(.202–.999)
Marital Status (Ref: single)			
Married	.610 (.228)	.121 (.008)	(.162–1.057)
Other	.273 (.308)	.037 (.376)	(-.332–.878)
Religious Belief (Ref: no)	-.097 (.195)	-.018 (.619)	(-.479–.286)
Employment Status (Ref: other)	-.104 (.192)	-.019 (.590)	(-.481–.274)
Environmental Values			
Live in harmony with nature	.272 (.100)	.129 (.007)	(.075–.469)
Respect the Earth	.001 (.105)	.000 (.996)	(-.205–.206)
Protect the environment	.069 (.115)	.030 (.546)	(-.156–.295)
Tolerance of Environmental Protection Cost			
Willingness to pay much higher prices to protect the environment	.408 (.104)	.189 (.000)	(.204–.612)
Willingness to pay much higher taxes to protect the environment	.192 (.104)	.088 (.064)	(-.012–.395)
Willingness to reduce living standards to protect the environment	.424 (.079)	.184 (.000)	(.270–.578)
Confidence in Citizen Participation in Environmental Policies			
The opportunities for the general public to influence environmental protection policies are very limited a	.059 (.090)	.023 (.511)	(-.118–.236)
Citizen participation helps improve the quality of environmental protection policies	.059 (.159)	.013 (.710)	(-.252–.370)
Citizens have the ability to propose constructive suggestions on environmental protection policies	.336 (.113)	.104 (.003)	(.113–.558)
F-value (p-value)		11.368 (<.001)	
R^2		.215	
Adjusted R^2		.196	

Note: a Reverse coded.

Table 4. Multiple Linear Regression Model Explaining Women's Pro-Environmental Behavioral Intentions in 2020 Taiwan Social Change Survey (TSCS).

	Women		
	B (SE)	*β (p-value)*	95% CI
Constant	4.095 (.811)		(2.502–5.687)
Age	.011 (.006)	.081 (.061)	(.000–.022)
Residency (Ref: other)	.061 (.135)	.014 (.650)	(-.203–.326)
Educational Level (Ref: <=high school)			
Associate degree	.194 (.209)	.031 (.352)	(-.215–.604)
Bachelor degree or above	.365 (.171)	.086 (.033)	(.030–.700)
Marital Status (Ref: single)			
Married	.179 (.178)	.043 (.317)	(-.171–.528)
Other	.196 (.238)	.037 (.411)	(-.272–.664)
Religious Belief (Ref: no)	-.014 (.150)	-.003 (.928)	(-.308–.281)
Employment Status (Ref: other)	-.093 (.137)	-.023 (.500)	(-.362–.177)
Environmental Values			
Live in harmony with nature	.064 (.083)	.035 (.444)	(-.099–.227)
Respect the Earth	-.054 (.097)	-.026 (.578)	(-.244–.136)
Protect the environment	.326 (.095)	.150 (.001)	(.139–.513)
Tolerance of Environmental Protection Cost			
Willingness to pay much higher prices to protect the environment	.256 (.076)	.142 (.001)	(.107–.405)
Willingness to pay much higher taxes to protect the environment	-.026 (.077)	-.014 (.740)	(-.176–.125)
Willingness to reduce living standards to protect the environment	.345 (.062)	.181 (.000)	(.223–.466)
Confidence in citizen participation in Environmental Policies			
The opportunities for the general public to influence environmental protection policies are very limited a	.244 (.064)	.121 (.000)	(.119–.369)
Citizen participation helps improve the quality of environmental protection policies	.378 (.138)	.088 (.006)	(.108–.649)
Citizens have the ability to propose constructive suggestions on environmental protection policies	.367 (.095)	.125 (.000)	(.181–.553)
F-value (p-value)		10.648 (<.001)	
R^2		.173	
Adjusted R^2		.157	

Note: a Reverse coded.

the importance to their personal lives of protecting the environment, the stronger their pro-environmental behavior intentions (β = 0.150; p = 0.001). The more willing they were to pay much higher prices to protect the environment, the stronger pro-environmental behavior intentions (β = 0.142; p = 0.001). The more willing they were to reduce their living standards to protect the environment, the stronger their pro-environmental behavior intentions (β = 0.181; p = 0.000). The more they were confident that the general public has the opportunities to influence environmental protection policies, the stronger their pro-environmental behavior intentions (β = 0.121; p = 0.000). The more they were confident that citizen participation helps improve the quality of environmental protection policies, the stronger their pro-environmental behavioral intentions (β = 0.088; p = 0.006). The more they were confident that citizens have the ability to propose constructive suggestions on environmental protection policies, the stronger their pro-environmental behavioral intentions (β = 0.125; p = 0.000).

Discussion

Through statistical analysis of the survey data, the present study discovered differences between genders in the pro-environmental behavioral intentions, environmental values, tolerance of environmental protection cost, and confidence in citizen participation in environmental policies. The results showed that women had significantly stronger pro-environmental behavioral intentions than men. Moreover, between the two genders, the associations between dependent and independent variables were not totally consistent. Having a bachelor's degree (compared to those with a high school degree), willingness to pay much higher prices to protect the environment, willingness to reduce living standards to protect the environment, and confidence in the ability of citizens to propose constructive suggestions on environmental protection policies had positive associations with pro-environmental behavioral intentions across both gender cohorts. Emphasis on the living in harmony with nature was significantly positively related with the pro-environmental behavioral intentions only among the men. Emphasis on protecting the environment, confidence in opportunities for the general public to influence environmental protection policies, and confidence in the positive effects of citizen participation to the quality of environmental protection policies were significantly positively associated with the pro-environmental behavioral intentions only among women.

The increase in consciousness of the importance of starting small when practicing environmental protection in daily life appears to be more common, and the findings of the present study showed a similar phenomenon [31]. In Taiwan, it has long been the case that many shops no longer offer free plastic bags to their customers. Although the cost of a plastic bag to the customer is small, more and more people have gradually become accustomed to providing shopping bags themselves when going shopping outside [32]. In addition, the Taiwanese government is planning a blanket ban on single-use plastic items including straws, cups and shopping bags by 2030 [33]. In recent years, the Taiwanese environmental authorities have also encouraged restaurants to offer discounts as an incentive to customers who bring and use their own tableware [34]. During the COVID-19 pandemic, customers were not allowed to eat indoors in a restaurant, in order to reduce the risk of infection. However, some shops and restaurants were afraid of infection, and so they refused to allow customer to bring their own tableware to pack food [35]. Simply speaking, it is difficult to strike a proper balance between environmental protection and health, especially during the COVID-19 pandemic. In addition, in Taiwanese elementary schools, children are taught to bring their own personal handkerchiefs and toilet paper to maintain good health habits. However, although handkerchiefs seem to be more environmentally friendly than tissues, they raise hygiene concerns if sanitation cannot be guaranteed [36]. Consequently, while encouraging people to use handkerchiefs, environmental protection departments and organizations should also emphasize the importance of cleaning and sterilizing them.

The results of this study showed that in Taiwan, the pro-environmental behavioral intentions of men were not weak, but those of women were more stronger. In addition, the environmental values of women were generally higher than those of men. These results are consistent with prior studies that found that women are more engaged in pro-environmental behaviors than men [37-39]. In this regard, education and environmental protection departments might work together to plan and promote environmental education integrated with gender equity to fill this gender gap [40, 41]. For example, governments, communities, and schools could hold parenting activities related to environmental protection, and in particular could invite the fathers of children to participate.

With regard to gender differences in tolerance of environmental protection cost, we found that men were more willing to spend more money, while women would rather sacrifice a little of their quality of life. These results reflect the difference in men's and women's attitudes toward money [42], in that women report that they worry more frequently about money than men do [43]. In this regard, everyone can contribute to environmental protection in different ways. For example, many public benefit activities related to environmental protection need funding. Consequently, organizers might target their fundraising at men.

As to confidence in citizen participation in environmental policies, we found that, comparatively, men focused on opportunities, while women focused on abilities. In fact, both opportunities and abilities

are important. In this regard, Taiwanese governments should make the citizen participation platform for public policies related to environmental protection more widely known, as well as encourage the public to express their opinions and attach high importance to their suggestions. Moreover, governments, communities, non-profit organizations, and schools could jointly organize activities related to environmental protection education, such as lectures, film shows, fairs, dramas, exhibitions, etc., and invite citizens to attend.

Both men and women with a bachelor's degree had stronger pro-environmental behavior intentions than those who had only graduated from senior high schools. A previous study has also indicated that education causes individuals to be more concerned with social welfare and to accordingly behave in a more environmentally friendly manner [44]. Institutions of high education should explore ways to integrate teaching and research resources to provide courses and activities related to environmental protection to staff and students so as to develop their proper environmental awareness.

We also found that women with strong confidence in citizen participation in environmental policies had stronger pro-environmental behavior intentions than men. This shows that, with regard to environmental protection, many women not only had confidence in others, but also were willing to start small and discipline themselves. By comparison, some men might feel that environmental protection is other people's problem, and thus be less willing to devote themselves to it. In this regard, governments should educate the public, especially men, that environmental protection is not just a public affair, but can be practiced by everyone in the private sphere.

The present study has some limitations. First, given that this study used secondary data analysis, it was not possible to design and modify the items comprising each concept, and some important variables were not fully assessed in the survey. Second, all the survey items were completed through self-reports, and therefore, common method variance was inevitable. Third, in reality, gender is not neatly divided along the binary lines of "man" and "woman." Some people do not identify with any gender, while others identify with multiple genders [45]. These cases are not specifically discussed in the present study.

Conclusion

The present study showed that there are gender differences in Taiwanese citizens' attitudes related to pro-environmental behavioral intentions. More specifically, by comparing the two genders, we found that (i) women had stronger pro-environmental behavioral intentions than men, (ii) women held stronger environmental values than men, (iii) compared with women, men were more willing to pay much higher taxes to protect the environment, but were less willing to reduce their living standards, (iv) men were more confident in the opportunities for the general public to influence environmental policies, but women were more confident in the ability of citizens to propose constructive suggestions on environmental protection policies. Moreover, factors significantly associated with pro-environmental behavioral intentions were not identical between two genders. Having a bachelor's degree (compared to those with only a high school degree), willingness to pay much higher prices to protect the environment, willingness to reduce living standards to protect the environment, and confidence in the ability of citizens to propose constructive suggestions on environmental protection policies all had positive associations with pro-environmental behavioral intentions across both gender cohorts. Consequently, to increase the pro-environmental behavioral intentions of citizens, it is important for the Taiwanese government to take the specific characteristics of each gender into consideration in order to encourage all citizens to contribute to environmental protection.

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Conflict of Interest

The authors declare no conflict of interest.

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