



## Online environmental community members' intention to participate in environmental activities: An application of the theory of planned behavior in the Chinese context

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### ABSTRACT

This study investigated the factors associated with online environmental community members' intention to participate in environmental activities in the Chinese context, employing the framework of the theory of planned behavior (TPB). Using data from a survey of community members ( $N = 211$ ), structural equation modeling analyses confirmed the roles of subjective norm and self-efficacy in affecting intention to participate in environmental activities. Unlike other TPB studies, however, the study discovered that attitude was not significantly associated with intention. In addition, other relevant factors, including ego involvement, group identification, perceived salience of environmental problems, perceived popularity of environmental activities, and perceived interactivity of the community websites, were found to be associated with the intention of participation, either directly or indirectly. The theoretical and practical implications were discussed.

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### 1. Introduction

The growing popularity of the Internet has led researchers to explore its role in empowering social movement groups and helping activists initiate social changes (Kahn & Kellner, 2004). Thanks to various applications and features of the Internet, people at the grassroots level are now able not only to demonstrate dynamic power and adopt more sophisticated strategies to change their society, but also to send out their messages to potential audiences (Best & Kellner, 2001). Activists worldwide are utilizing economical and efficient Internet applications to disseminate claims and criticisms about social and political issues. Furthermore, an increasing number of protests and self-organizing activities are now performed by online activist communities.

Online environmental communities are one of the most active online activist groups (Sehmel, 2004). In particular, Chinese online environmental communities are evolving and developing rapidly (Yang, 2003; Yang & Taylor, 2010). These groups benefit from the fast adoption rate of the Internet in China and are influenced by the advocacy of domestic and international environmental non-government organizations (ENGOS). Unlike other traditional Chinese organizations, online environmental communities are grassroots-oriented and characterized by citizens' democratic

participation in “self-organizing and community action” (Yang, 2003, p. 89). The diverse voices of these online communities contribute to the public discourse of environmental issues and represent a socially significant trend in China, namely, the burgeoning civic society (Yang, 2005). Thus, research on the development and operation of these communities can offer profound social and political implications with respect to the role of the Internet in building the civic society and citizen participation in social issues in China. Also, given the huge population of China, citizen participation in environment-friendly activities can contribute considerably to the decline of environmental problems.

The Internet may be a desirable and efficient medium for mobilizing a large number of people for environmental activities in China. Environmental movements in China since 2000 have occurred parallel with the popularization of the Internet (Yang, 2009). Scholars have also documented the emerging Chinese Internet culture and have recognized the Internet's strong influence on the political, economic, and social lives of Chinese people (Yang, 2009). Furthermore, if the appropriate strategies are employed, the Internet can provide opportunities for environmental communities to mobilize millions of citizens to participate in low-cost environment-friendly activities.

Studies have demonstrated that online environmental communities are an important source of environmental information (Riffe, 2006); online environmental communities help raise people's awareness of environmental problems (Scharl, Pollach, Pieber, & Treiblmaier, 2004) and promote environmental activities (Kahn &

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Kellner, 2004; Sehmel, 2004). Studies have also documented that millions of citizens, younger generations in particular, are engaged in activities promoted by online environmental communities (Lee, 2007; Yang, 2009).

Despite the importance of online environmental communities in China, from both academic and practical standpoints, research on Chinese online environmental communities is relatively thin. Also, studies about the factors affecting online environmental community members' intention to take part in advocated environmental activities have rarely been located. The present study aims to fill the gap in the literature in the area of online environmental communities in China. Moreover, given the severity and widespread impact of environmental problems in China, social movements that can mobilize the general public are crucial to finding meaningful solutions to environmental issues (Yang, 2005). Nevertheless, in the socio-political environment of China, non-governmental and non-commercial voices often struggle to find their way into mass media (Tang & Zhan, 2008). The Internet presents an unprecedented opportunity for civil actors to reach out to the general public (Yang, 2003). This study explores a theoretical framework that may help increase the social influence of online environmental communities, thereby suggesting socially significant and practically feasible implications. To achieve these goals, the theory of planned behavior (TPB; Ajzen, 1988, 1991) is employed as a theoretical framework, incorporating other factors identified from relevant literature. In the current study, environmental activities refer to the following three types of activities: (1) environmental improvement activities (e.g., sponsoring or funding environmental projects; working with non-profit volunteers to improve the environment); (2) environmental education activities (e.g., providing educational information about the value of wet lands or wild animals; participating in exchange and recycling programs with schoolchildren); and (3) environmental mentoring activities (e.g., providing environmental assistance to local government officials).

## 2. The current environmental situation and ENGOs in China

China's enormous population and rapid economic development have caused pervasive environmental problems (Harris, 2006) and forced different social sectors from the government to grassroots organizations to consider environmental protection. The Chinese government has begun to realize that the severity of the scale and nature of environmental issues may threaten the country's long-term prosperity (Yi, 2006). In recent decades, the Chinese government has enacted twenty laws, forty regulations and hundreds of national standards related to environmental protection (Stalley & Yang, 2006). Concerns for environmental protection, however, have been compromised by the need to maintain the current rate of economic development. Slowing down the economic development rate, for example, may result in social instability and exacerbate social problems. Thus, the government alone may not be able to provide sufficient solutions to environmental issues in China, and ENGOs may play a critical role in environmental activities.

ENGOs are one of the most active NGOs in China (Li, 2006), and they are credited with stimulating civil movements in the country (Lee, 2007). Studies have documented that Chinese ENGOs have promoted citizens' negotiations with local governments and successfully organized civic participation in environmental protection activities (Saich, 2000). By 2005, there were about 2768 registered ENGOs in China (Tang & Zhan, 2008). In addition, surveys have found that environmental awareness in China is more salient among young generations than among their older counterparts. In the university context in particular, according to a survey in the mid-2000s, among 176 universities across 26 provinces, at least one student environmental protection group existed in each

university (Hongyan, 2004). This trend suggests a promising future for Chinese ENGOs and their active participation in environmental activities.

## 3. Online environmental communities

The concept of community is by no means new, and communities have existed throughout human history. However, as computer-mediated communication (CMC) increasingly becomes part of our daily lives, the online version of communities is generating interest in academic circles. As such, studies have explored the meaning, nature, and social consequences of online communities (Best & Kellner, 2001). Online communities vary greatly with respect to content, topics, features, and structure (Stanoevska-Slabeva & Schmid, 2001). One common point of online communities, however, is that they have the shared goal of eliciting participation or donation from those who visit their websites (Wise, Hamman, & Thorson, 2006).

Several studies have proposed typologies for categorizing online communities (e.g., Lazar & Preece, 1998; Stanoevska-Slabeva & Schmid, 2001). For instance, based upon community aims and technological platforms, Stanoevska-Slabeva and Schmid (2001) suggested the following four types of online communities: (1) *discussion communities* dedicated to exchanging information about certain topics, (2) *task- and goal-oriented communities* striving to achieve a common goal by way of cooperation, (3) *virtual worlds* providing a virtual place such as galaxies or even virtual societies, and (4) *hybrid communities* combining various types of online communities.

Online environmental communities, according to the typology above, belong to task- and goal-oriented communities. Online environmental communities are operated mainly by ENGOs (Yang, 2005). Although each of the online environmental communities has its own specialty, most of them are dedicated to raising the public's environmental consciousness, promoting sustainable development and nature conservation, and engaging in political advocacy (Scharl et al., 2004; Yang, 2005). Online environmental communities also stand for a postmodern activism trend, which demonstrates "how new media and grassroots progressivism might synergize, excite the world, and challenge status quo culture and politics" (Kahn & Kellner, 2004, p. 87). This trend not only promotes social changes in developed countries but also is growing rapidly in developing countries such as China (Yang, 2005).

The goals of online environmental communities are not just to provide a virtual space for members to exchange opinions, but rather to mobilize members to participate in advocated online and offline actions. Online actions may include email petitions, lobbying, environmental information posting, and even blockade or sabotage. Offline actions can include protests, sit-ins, field trips, and environmental campaigns (Postmes & Brunsting, 2002).

## 4. The theory of planned behavior in the online environmental community context

The theory of planned behavior (TPB) is an appropriate theoretical framework for this study, given that environmental activities are a kind of volitional behavior and that the purpose of the present study is to investigate online environmental community members' intention to participate in advocated environmental activities. The TPB is a social psychological model used to examine the relationship between certain variables and people's behavioral intention to engage in a targeted behavior (Ajzen, 1991). There are three components of the TPB: (1) attitude toward a particular behavior, (2) subjective norms related to the behavior, and (3) perceived behavioral control of the behavior. These three components

jointly influence behavioral intention, which is assumed to be directly related to actual behavior. The TPB predicts that the more positive the attitude toward a certain behavior, the greater the perceived pressure from important people related to the behavior, and the more confidence one has in conducting the behavior, the stronger an individual's intention to carry out the specific behavior.

In the field of communication research, the TPB is often used in the health communication context (e.g., Bae & Kang, 2008; Bresnahan et al., 2007; Lee, Hubbard, O'Riordan, & Kim, 2006; Park & Smith, 2007) or in advertising research (e.g., Lim & Dubinsky, 2005). In recent years, an increasing number of studies began applying the TPB to explore variables affecting people's online behaviors (e.g., Ho, Lee, & Hameed, 2008; Liao, Chen, & Yen, 2007; Lu, Zhou, & Wang, 2009).

Findings from these studies generally support the TPB. However, the predictive accuracy of the three components varies across situations (Ajzen, 1991). Some scholars have suggested that in different contexts, other variables, such as former experience (Park & Smith, 2007) or participants' demographic or religious variables (Ho et al., 2008) can yield more valid prediction results. To improve the accuracy of the TPB in different contexts, other researchers either extended the original TPB model or made context-specific changes (Bae & Kang, 2008; Bresnahan et al., 2007; Lee, Hubbard, O'Riordan, & Kim, 2006; Park & Smith, 2007).

In the context of environmental activities, participants' attitude toward an advocated behavior has been suggested as a valuable predictor of environmental actions (Lubell, 2002). Postmes and Brunsting (2002) conducted an online study among the members of Dutch online environmental communities. Findings from the study suggest that, in the online context, people's attitude toward advocated environmental activities is a powerful predictor of behavioral intention. Other studies have also reported similar findings about the association between attitude and online collective actions (e.g., Brunsting & Postmes, 2002; Stürmer & Simon, 2004). Thus, the following hypothesis was proposed:

**H1.** Attitude toward environmental activities will be positively associated with online environmental community members' intention to participate in environmental activities.

In the TPB, the concept of subjective norms refers to the perceived social pressure to perform or not to perform a behavior of interest (Ajzen, 1991). In a study about the Internet's potential for collective actions, Brunsting and Postmes (2002) found that subjective norms are one of the most influential predictors of people's intention to join both offline and online collective actions.

Related to the role of subjective norms, it should be noted that Chinese people are deeply influenced by the Confucian culture (Francesco & Chen, 2004). The Confucian culture values social harmony based on relationships that define social members' roles and the perceived moral pressure individuals experience in fulfilling their roles. This culture requires individuals to show respect to the viewpoints of significant others. In the Confucian culture, subjective norms may be especially a strong predictor of individuals' behavioral intention. Furthermore, as Rhee, Uleman, Lee, and Roman (1995) claimed, for people from an individualistic culture, behaviors are often caused by individuals' attitudes, judgments, and opinions toward certain behaviors. In contrast, for people from a collectivistic culture, individuals' attitudes, judgments, and opinions can be understood as situation-specific, highly diagnostic, and affected by subjective norms. For instance, Lee, Hubbard, O'Riordan, and Kim (2006) found that, in a collectivistic culture, smokers' behavioral intention toward quitting smoking is affected by their subjective norms. Thus, in the context of environmental activities, the following hypothesis was set forth:

**H2.** Subjective norms will be positively associated with online environmental community members' intention to participate in environmental activities.

According to the TPB, perceived behavioral control (PBC) refers to individuals' perception of whether a given behavior is easy or difficult to perform, and "it is assumed to reflect past experience as well as anticipated impediments and obstacles" (Ajzen, 1991, p. 188). Environmental activities include a variety of activities (e.g., recycling papers and plastic bottles, environmental sit-ins and petitions, and other voluntary activities as listed above), and they differ vastly in the level of difficulty (SeGuin, Pelletier, & Hunsley, 1998). In previous literature concerning environmental actions, perceived self-efficacy—individuals' sense of competence about performing a specific behavior—was proposed as an operational version of PBC (Brunsting & Postmes, 2002). Further, environmental actions are by nature a type of collective actions (Brunsting & Postmes, 2002; Lubell, 2002). Therefore, perceived collective efficacy may also play an important role in predicting environmental activities. Collective efficacy refers to group members' confidence in the group's collective competence in realizing their goals (Bandura, 1986). Community members with high collective efficacy are likely to "participate more in their socio-cultural environments, secure and access more community resources, develop stronger networks of social support, and feel more personal empowerment" (Smith, Ferrara, & Witte, 2007, p. 58). Thus, the current study assumes that both self-efficacy and collective efficacy are components of PBC. The following hypothesis was suggested:

**H3.** Perception of (a) self-efficacy and (b) collective efficacy will be positively associated with online environmental community members' intention to participate in environmental activities.

## 5. Other relevant factors and hypothesis development

Since the TPB is a general and parsimonious model, it can be applied to different types of behaviors (Bae & Kang, 2008). However, because only behavior-specific attitudes and beliefs are incorporated in the original model, little information about the factors that affect these attitudes and beliefs has been provided. Ajzen (1991) also noted that "broad attitudes and personality traits have an impact on specific behaviors only indirectly by influencing some of the factors that are more closely linked to the behavior in question" (p. 181). Therefore, to apply the TPB to a specific context, researchers need to pinpoint what factors are related most closely to the behavior under study. In the current study, we propose an extended TPB model to provide more practical, helpful information for online environmental communities. Based upon an extensive review of literature about online communities and environmental activities (e.g., Brunsting & Postmes, 2002; Elliot, Seldon, & Regens, 1997; Ho et al., 2008; Lubell, 2002; Riffe, 2006), the present study identified several factors in three aspects: (1) individuals' level of involvement, including ego involvement and group identification; (2) individuals' perceptions in societal factors, including perceived salience of environmental problems and perceived popularity of environmental activities; and (3) the technological aspect, including perceived interactivity of the community websites.

### 5.1. Ego involvement

For online environmental community members, participation in environmental activities can be a representation of self-expression. The community members' ego involvement—individuals' self-

concept related to a particular issue or activity (Lapinski & Rimal, 2005)—is expected to influence intention to participate in environmental activities. Ego involvement is an important component of individuals' self-image (Perloff, 1989), and it is connected to an individual's core values and strong commitments to given behaviors (Sherif, Kelly, Rodgers, Sarup, & Tittler, 1973). Past research has found associations between ego involvement and attitude (Park, Jung, & Lee, 2011) and the behavior in question (e.g., Conner & Armitage, 1998; Lapinski & Boster, 2001; Park et al., 2011). Thus, we propose the following hypothesis:

- H4.** Ego involvement will be positively associated with online environmental community members' (a) attitude toward environmental activities and (b) intention to participate in environmental activities.

### 5.2. Group identification

The willingness to participate in environmental activities is likely to be affected by opinions from the community members' referent groups. In the context of online communities, the salient referent group may be other members who also linger on the same online community (Neuwirth & Frederick, 2004). The importance of online community members' group identifications can be understood from the social identity perspective (Taylor & Spencer, 2004). Postmes and Brunsting (2002) suggested that, as online community members interact with each other, a group identity can develop. The more individuals identify with the group, the more likely they are to feel obliged to behave in accordance with the rules and conventions promoted in the online community. As individuals develop stronger relationships with other members in online communities, other members' opinions become more influential (Butler, Sproull, Kiesler, & Kraut, 2007; Klandermans, 2002). Also, increased group identity enhances individuals' self-efficacy and collective efficacy toward environmental activities. The following hypothesis was proposed:

- H5.** Group identity will be positively associated with online environmental community members' (a) self-efficacy, (b) collective efficacy, and (c) intention to participate in environmental activities.

### 5.3. Perceived salience of environmental problems

Findings from several studies in the field of environmental research support the importance of perceived salience of environmental problems in affecting individuals' behavioral intention toward taking part in environmental activities (Elliot et al., 1997; Lubell, 2002). That is, the more participants perceive the severity of environmental problems, the more likely they are to participate in environmental activities. The following hypothesis was offered:

- H6.** Perceived salience of environmental problems will be positively associated with online environmental community members' intention to participate in environmental activities.

### 5.4. Perceived popularity of environmental activities

As described earlier, within the TPB framework, subjective norms are important in affecting individuals' behavior of interest. It should be noted, however, that not just the direct social pressures of subjective norms, but indirect influences such as one's perception that significant others are conducting a certain behavior, may also trigger an individual's behavior. In other words, perceived

popularity of a certain behavior (Zhu & He, 2002) can be a facilitator of individuals' actual behavior. As Cho (2011) pointed out, the concept of perceived popularity has been utilized in studies of people's adoption and use of new communication technologies with different terms, such as perceived critical mass (Markus, 1987; Van Slyke, Ilie, Lou, & Stafford, 2007), perceived network effects or network externalities (Katz & Shapiro, 1985), or descriptive norms (Lapinski & Rimal, 2005). Ajzen (2002) who developed the TPB also suggested that descriptive norms, as opposed to subjective norms, provide the theory with more comprehensive explanations to the social influences on the behavior in question. For example, Cho (2011) discovered that perceived critical mass, which is equivalent to the concept of perceived popularity, played an important role in Singaporeans' adoption and use of 3G mobile phones. In the context of online environmental communities, participants' perception that other members are participating in environmental activities is likely to lead to a positive attitude toward environmental activities and to provide them with a cue of decision making to engage in the activities. Thus, the following hypothesis was offered:

- H7.** Perceived popularity of environmental activities will be positively associated with online environmental community members' (a) attitude toward and (b) intention to participate in environmental activities.

### 5.5. Perceived interactivity of online community websites

Given that the current study focuses on online environmental community members' intention to participate in environmental activities, technical aspects of those community websites should be considered. Prior research suggests that website interactivity is an important component in facilitating online activities. Studies about website interactivity have explored features that increase online interactivity (e.g., Coyle & Thorson, 2001). Studies also concentrated on website visitors' perception of interactivity (McMillan, Hwang, & Lee, 2003; Song & Zinkhan, 2008; Wise et al., 2006) and the possible effects of interactivity (Sundar, Kalyanaraman, & Brown, 2003). For instance, Sundar et al. (2003) examined the effect of interactivity on visitors' attitude toward a political candidate supported on a website. The study suggested that there was a positive relationship between website interactivity and visitors' behavioral intention to vote. Thus, the following hypothesis was proposed:

- H8.** Perceived interactivity of online community websites will be positively associated with online environmental community members' intention to participate in environmental activities.

To summarize, integrating the literature and hypotheses described above, the proposed research model for the current study is presented in Fig. 1.

## 6. Method

### 6.1. Participants

We contacted members of online environmental communities in China through their community websites. The websites were identified through another site, *Chinese Environmental NGOs Online* (<http://www.greengo.cn>). The site is the most comprehensive information resource about Chinese NGOs. One hundred and fifty one NGOs from mainland China are registered members of the website, and 68 of them (45%) have their own websites or online forums. Through the links provided on *Chinese Environmental NGOs*

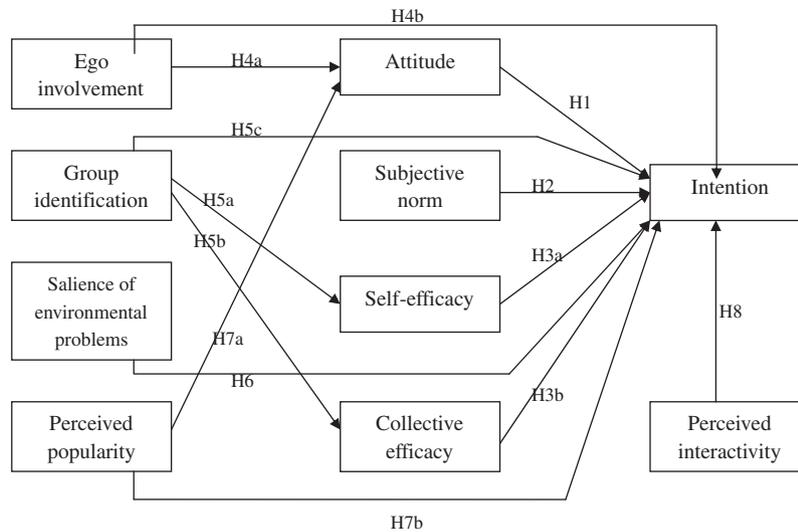


Fig. 1. Hypothesized model.

Online, we contacted the 68 ENGOs via email. Nine of them gave permission to post a link to our survey questionnaire on their websites. A flier that introduced the purpose of the current study was posted on the websites of the nine Chinese online environmental communities. A link to a web-based online survey was constructed and attached to the flier. Through clicking the link, participants could visit the online survey page. Overall, 260 participants participated in the survey from December 2008 to March 2009.

## 6.2. Measurements

*Attitude toward environmental activities* was measured with eight 7-point semantic differential items. Ajzen (2002) suggested that attitude toward a certain behavior should be measured as an individual's overall evaluation of the target behavior. Following Ajzen's suggestion, the present study measured the affective and instrumental aspects of attitude. The affective items are: "Participating in environmental activities is enjoyable—not enjoyable (reverse-coded), unpleasant—pleasant, favorable—unfavorable (reverse-coded), foolish—wise." The instrumental items include: "Participating in environmental activities is useful—not useful (reverse-coded), unimportant—important, beneficial—not beneficial (reverse-coded), worthless—valuable." The items from the two aspects were summed to create the composite variable of attitude ( $\alpha = .84$ ).

*Subjective norm* was measured with three statements anchored by a 7-point Likert scale ranging from "strongly disagree (1)" to "strongly agree (7)" (all statements for other variables were also anchored by the same scale unless otherwise indicated): (1) "Most people important to me think that I should participate in environmental activities," (2) "Most people whose opinion I value consider that I should participate in environmental activities," and (3) "It is expected of me that I participate in environmental activities" ( $\alpha = .86$ ).

*Perceived behavioral control* was measured with two dimensions: self-efficacy and collective efficacy. In the current study, the measure of self-efficacy included the concept of controllability as well, including five statements and one question: (1) "It is easy to participate in environmental activities," (2) "I am confident about participating in environmental activities," (3) "I know how to participate in environmental activities," (4) "It is mostly up to me whether or not I participate in environmental activities," (5) "I can fully control my behavior of participating in environmental

activities," and (6) "How much control do you believe you have over participating in environmental activities?" which was answered by "not at all (1)" to "very much (7)" ( $\alpha = .80$ ). Smith et al. (2007) used three items to measure collective efficacy in a health communication context. We modified their items reflecting the current study's context: (1) "Members of my online community are willing to join in and do their share of work for advocated environmental activities," (2) "Members of my online community can work together very well," and (3) "Members of my online community are willing to mobilize resources to achieve advocated environmental activities" ( $\alpha = .91$ ).

*Behavioral intention to participate in environmental activities* was an index composed of five statements suggested by Ajzen (2002), including "I plan to take part in environmental activities in the near future," and "I am willing to take part in environmental activities advocated in the online community in the near future" ( $\alpha = .88$ ).

*Ego involvement* was measured with three statements derived from Conner, Warren, Close, and Sparks' (1999) self-identity scale: (1) "Participating in environmental activities will be an important part of who I am," (2) "I would feel a loss if I were forced to give up participating in environmental activities," and (3) "Participating in environmental activities will be a normal part of my life" ( $\alpha = .71$ ). *Group identification* was measured with four statements including: (1) "I see myself as a member of the online environmental community," (2) "I am glad to belong to the online environmental community," (3) "I feel strong ties with other members of the online environmental community," and (4) "I identify myself as a member of the online environmental community" ( $\alpha = .88$ ).

*Perceived salience of environmental problems* was measured with 14 statements, which combined Brunsting and Postmes' (2002) and Riffe's (2006) scales, examining the perception of local environmental problems and environmental issues in general. It included: "The water quality in lakes, rivers, and streams is declining in China," "Improper disposal or dumping of industrial or factory chemicals is a common phenomenon," and "Maintaining nature is the most important task of our society" ( $\alpha = .88$ ). *Perceived popularity of environmental activities* was measured with a modified version of Van Slyke et al.'s (2007) perceived critical mass scale, including (1) "My relatives/friends/acquaintances are participating in environmental activities," (2) "Other members of the online community are participating in environmental activities," (3) "Many young people are participating in environmental activities,"

**Table 1**  
Zero-order correlations, means, and standard deviations (N = 211).

Variable	1	2	3	4	5	6	7	8	9	10	M	SD
1. Attitude	1	.49**	.45**	.22**	.39**	.22**	.21**	.35**	.28**	.39**	6.00	.93
2. Subjective norm		1	.44**	.40**	.46**	.43**	.25**	.38**	.42**	.54**	5.05	1.26
3. Self-efficacy			1	.47**	.60**	.45**	.28**	.50**	.46**	.63**	5.02	1.01
4. Collective efficacy				1	.43**	.55**	.10	.49**	.47**	.50**	4.35	1.19
5. Ego involvement					1	.52**	.26**	.55**	.50**	.60**	4.63	1.11
6. Group identification						1	.12	.47**	.68**	.58**	4.44	1.07
7. Salience of environmental problems							1	.15*	.28**	.31**	5.57	.84
8. Perceived popularity								1	.42**	.55**	4.73	1.05
9. Perceived interactivity									1	.57**	4.68	.93
10. Behavioral intention										1	5.11	1.01

\* p < .05.  
\*\* p < .01 (2-tailed).

and (4) “Many Chinese are participating in environmental activities” ( $\alpha = .83$ ). *Perceived interactivity of online community websites* was measured with seven statements modified from McMillan and Hwang’s (2002) scale that focused on three key dimensions of website interactivity: two-way communication, user control, and time delay. It included: “Functions of this online community website facilitate two-way communication,” “When I visit this online community website, I feel I am in a real “place” in cyberspace,” and “I feel that I have a great deal of control over my visiting experience at this online community website” ( $\alpha = .91$ ).

**7. Results**

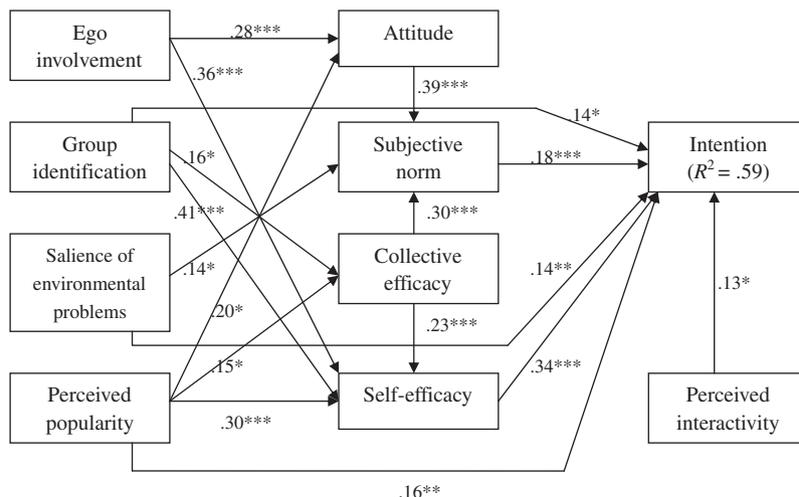
*7.1. Descriptive statistics*

Among 260 survey participants, 211 responses were valid and used for statistical analyses; the rest did not answer more than half of the survey questions. Of the final 211 participants, 105 were female (49.8%) and 101 were male (47.9%). Five participants did not indicate their sex. The average age of the participants was 25.37 ( $SD = 6.39$ ,  $Median = 24$ ,  $Mode = 23$ ,  $range = 16-58$ ). Seven participants did not provide their age. In terms of education level, 12 participants (5.8%) possessed an education level of high school or lower, while two participants (1.0%) had a junior college education. The majority of the participants had either a bachelor’s or master’s degree (91 participants each, 86.2%). One participant had a professional degree, while nine participants (4.4%) had a doctoral degree.

Five participants did not indicate their education level. With respect to monthly income, more than half of the participants (122 participants, 57.8%) earned less than 1000 Yuan, approximately \$152, the lowest category in the present study. There were 37 participants (17.5%) who earned between 1000 and 3999 Yuan, while 25 participants (11.9%) earned between 3000 and 4999 Yuan. There were 16 participants (7.5%) whose monthly income was greater than 5000 Yuan. Eleven participants did not provide their monthly income. In addition, the majority of the participants (178 participants, 84.3%) had used the Internet for more than 2 years, while 24 participants (11.4%) had used the Internet for less than 2 years.

*7.2. Test of proposed research model*

The current study used structural equation modeling (SEM) with the LISREL 8.80 program to test the proposed research model and hypotheses. Prior to the SEM analysis, we conducted correlation analyses with all the variables. Table 1 shows the correlation matrix. All pairwise associations were positively correlated with one another. The highest correlation coefficient among the variables was .68, the association between group identification and perceived interactivity of online community websites. This highest correlation was smaller than the recommended threshold of .70 (Tabachnik & Fidell, 2001), suggesting that the constructs in the present study do not exhibit severe multicollinearity problems.



Note. \*p < .05, \*\*p < .01, \*\*\*p < .001.

**Fig. 2.** Revised model.

Maximum likelihood estimation was employed to estimate the research model. The model fit indices showed quite a poor fit. The chi-square statistic was significant for the hypothesized model,  $\chi^2(17, N = 211) = 144.37, p < .001$ , and the ratio of chi-square to degrees of freedom was not acceptable at 8.49 (144.37/17). For other indices, GFI was .88, AGFI was .61, NFI was .92, CFI was .93, and RMSEA was .19.<sup>1</sup> These statistics suggest a model revision. Modification indices (MIs) of the LISREL program, which help capture evidence of a poor fit (Byrne, 1998), suggested that the following paths between the variables could improve the model fit, with deletion of the nonsignificant paths in the initial model: (1) attitude to subjective norm, (2) collective efficacy to subjective norm and self-efficacy, (3) ego involvement to self-efficacy, (4) salience of environmental problems to subjective norm, and (5) perceived popularity to self- and collective efficacy. With these modifications, the chi-square statistic was significant for the revised model,  $\chi^2(18, N = 211) = 29.22, p < .05$ , and the ratio of chi-square to degrees of freedom was acceptable at 1.62 (29.22/18). For other indices, GFI was .97, AGFI was .92, NFI was .98, CFI was .99, and RMSEA was .06, indicating a significant improvement from the hypothesized model. This revised model was used to test the hypotheses and the final model is presented in Fig. 2.

### 7.3. Test of hypotheses

Hypotheses 1, 2, and 3a and 3b addressed the importance of the TPB variables in explaining online environmental community members' intention to participate in environmental activities. As shown in Fig. 2, neither attitude nor collective efficacy was significantly associated with intention, whereas subjective norms and self-efficacy were significantly associated with intention. Thus, Hypotheses 1 and 3b were not supported, whereas Hypothesis 2 and Hypothesis 3a were supported. However, it is notable that attitude affected intention indirectly through subjective norms, while collective efficacy did the same through subjective norms and self-efficacy.

Hypotheses 4–8 dealt with other relevant variables' associations with online environmental community members' intention to participate in environmental activities (H4 for ego involvement, H5 for group identification, H6 for perceived salience of environmental problems, H7 for perceived popularity of environmental activities, and H8 for perceived interactivity of online community websites). As shown in Fig. 2, ego involvement was positively associated with attitude, supporting Hypothesis 4a, whereas it was not significantly associated with intention, disconfirming Hypothesis 4b. However, ego involvement was found to be significantly associated with self-efficacy through the revision process. Group identification was positively associated with self-efficacy, collective efficacy, and intention to participate in environmental activities. Thus, Hypothesis 5a, 5b, and 5c were supported. Perceived salience of environmental problems was a positive predictor of intention as expected, supporting Hypothesis 6. The variable was also found to be associated with subjective norms. Perceived popularity of environmental activities was associated positively with attitude and intention, supporting Hypothesis 7a and 7b. The variable was also

found to be significantly associated with self-efficacy and collective efficacy. Perceived interactivity of online community websites was associated positively with intention to participate in environmental activities. Thus, Hypothesis 8 was supported. Overall, the revised model explained 59% of the total variance in intention ( $R^2 = .59$ ).

## 8. Discussion

This study investigated the factors associated with online environmental community members' intention to participate in environmental activities in the Chinese context, using the TPB framework. The study found that the TPB is a useful theoretical model, confirming the important roles of subjective norms and self-efficacy in affecting intention to participate in environmental activities. Unlike other TPB studies, however, the current study discovered that attitude was not significantly associated with intention. In addition, the study found that there are other factors associated directly or indirectly with intention toward environmental activities.

### 8.1. Interpretations of the findings

It is somewhat surprising that attitude did not have a significant association with intention, given that attitude has been a consistent contributor to accounting for intention or actual behavior of interest in other TPB studies. However, it is understandable that, in the Chinese context where the Confucian culture is predominant, subjective norms are a more powerful factor in explaining intention to participate in environmental activities. In a considerable number of TPB studies, subjective norms have been the weakest factor among the three variables used to explain the intention or the behavior in question, while attitude has been the strongest (Armitage & Conner, 2001). In individualist societies, such as the United States, individuals' attitudes and independent opinions may exhibit strong influences on their decision making or behavioral intentions. By contrast, in collectivist societies such as China, social influences or social pressure can be a more important predictor of individuals' behavioral intentions or actual behaviors. This may be especially true when the behavior in question is related to socially desirable or normative activities. The role of perceived popularity of environmental activities supports this claim, as well. The present study found that intention was not only influenced directly by the opinions of significant others (subjective norm) but also indirectly by perceptions that other people are working for a better environment. This finding is in line with Ajzen's (2002) claim that descriptive norms can be another critical predictor of behaviors or behavioral intentions. Perceived popularity even enhanced online community members' self- and collective efficacies, which in turn affected intention. Therefore, the current study's findings provide more evidence that perceived popularity of a certain behavior (i.e., descriptive norms) can play an integral role in affecting behavior.

In keeping with previous studies, self-efficacy was associated significantly with intention to participate in environmental activities. A more interesting finding was the role of collective efficacy, which was included as another aspect of perceived behavioral control in the present study's context. Collective efficacy was associated significantly with subjective norms and self-efficacy. This indicates that the confidence of the group, as a whole, can be channeled into perceived peer pressure and participants' individual confidence. Given that environmental activities cannot be achieved via individual behaviors, it is obvious that the perceived confidence of collective capability to achieve environmental goals may be a facilitator that helps turn rhetoric into action.

<sup>1</sup> GFI (Goodness-of-Fit Index) is a measure of the relative amount of variance and covariance in the observed covariance matrix ( $S$ ) that is predicted by the fitted model covariance matrix ( $\Sigma$ ), while AGFI (Adjusted Goodness-of-Fit Index) differs from GFI in that it adjusts for the number of degrees of freedom in the specified model (Bollen, 1989). NFI (Normed Fit Index) and CFI (Comparative Fit Index) evaluate the comparison of a hypothesized model with the null model (Byrne, 1998). RMSEA (Root Mean Square Error of Approximation) estimates the extent to which a model, with unknown but optimally chosen parameter values, fits the population covariance matrix (Byrne, 1998). For a hypothesized model to be a good fit, GFI and AGFI need to be close to 1.00, NFI and CFI need to be greater than .90, and RMSEA needs to be less than .05 (Bentler, 1990).

The variables of individuals' involvement level—ego involvement and group identification—played an important role in accounting for intention in the current study. Specifically, the more community members believe that participation in environmental activities is an expression of themselves, the more likely they are to possess a positive attitude toward environmental activities. Furthermore, strong psychological attachment to online environmental activist communities was a significant contributor to self- and collective efficacies, as well as intention to participate in environmental activities. The significant role of group identification demonstrates that, together with the role of subjective norms, the sense of being a group member and the group members' influences are powerful drivers for environmental activist behaviors in the Chinese context where the Confucian culture is prevalent.

The present study confirmed that perceived salience of environmental problems is positively associated with individuals' intention to take part in environmental activities (Elliot et al., 1997; Lubell, 2002). Furthermore, perceived salience affected subjective norms, as well. This indicates that the more individuals perceived the seriousness of environmental problems, the more likely they are to feel pressure to activate their behavior. From a practical standpoint, online community leaders can motivate their members to participate in environmental activities by emphasizing the significance of environmental problems.

The technological aspect of perceived interactivity of community websites was also significantly associated with online environmental community members' intention to participate in environmental activities. This finding indicates that the Internet can be an efficient and effective tool for eliciting civic participation and mobilizing social movements, such as environmental activities. As suggested, the Internet can disseminate diverse voices and transform those voices into actions when the voices are appeals for social goods that require collective effort.

## 8.2. Theoretical and practical implications

The current study has theoretical and practical implications. On the theoretical side, the study shows that the predictive power of the TPB is culturally sensitive. Findings suggest that three TPB variables—attitude, subjective norms, and perceived behavioral control—may not always be significant predictors of behavioral intentions. In the current study, attitude was not associated significantly with intention to participate in environmental activities in the Chinese context. This finding contradicts studies conducted in Western contexts. Future studies are encouraged to test the relevance and variance of the TPB variables in other non-Western cultural contexts to validate the current study's findings. Furthermore, the present study added several relevant variables that may affect online environmental community members' intention to participate in environmental activities. Given that the TPB is a parsimonious model, the search for the relevant variables can be a worthy endeavor for theoretical advancement.

On the practical side, the study provides some guidelines for environmental activists. Given that the Internet is a particularly important vehicle for activists with limited resources to reach the general public, practical suggestions that help activists better utilize online communities are especially valuable. The current study found that subjective norms—the weakest factor in some other TPB studies—were especially powerful in the online context in China. Also, ego involvement, group identification, perceived salience of environmental problems, and perceived popularity of environmental activities were associated significantly with intention to participate in environmental activities. Overall, these findings suggest that it is important to build an atmosphere where people believe that environmental activities should be pursued as a social goal. Also, the leaders of online environmental commu-

nities need to recognize that a successful mobilization of environmental activities can be best achieved when members of the communities perceive and integrate the social trend of environmental activities with their selves. It should be also noted that, for promotion of an environmental activity or campaign in China, it is necessary to encourage interpersonal and/or group communication among members to create a setting in which individual members feel that the environmental activity or campaign is popular among their peers. Finally, the importance of perceived interactivity of community websites indicates that community leaders need to be keenly aware that websites, themselves, can affect members' behavioral intentions. By making sure that websites are highly interactive, regularly updated, and designed to incorporate new applications, community leaders can enhance the environmental activities of their members. In other words, the present study suggests that online community websites designs and interactivity need to be part of the environmental activity campaign strategy.

The present study comes with a few limitations. First, the study suffers from a limited sample because it could not survey all of the online environmental communities in China. Also, the findings of the present study were obtained from young and well-educated Internet users, rendering generalization of the findings difficult. Future studies need to pursue other ways to recruit more participants to generalize this study's findings. Second, given that environmental problems are critical issues in society, and community members may have diverse opinions with respect to participation in environmental activities, qualitative approaches such as in-depth interviews would have complemented this study's findings. Additionally, the current study was limited to an online context; therefore, it is unclear whether the medium (i.e., face-to-face and computer-mediated communication) has an impact on individuals' intention to take part in environmental activities. Future studies are encouraged to employ other methods such as meta-analysis to examine the potential impact of the medium.

In conclusion, the present study applied the TPB to investigate the factors that affect online environmental community members' intention to participate in environmental activities in China. Considering the enormous population of China, grassroots civic participation in environment-friendly activities may contribute significantly to decreasing environmental problems. This study suggests that a clear understanding of the psychological factors leading community members to participate in environmental activities may help promote the effectiveness of online environmental campaigns. More effective campaigns can offer solutions to the current environmental problems in China and around the globe.

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