

Article

An Investigation of the Influencing Factors of Chinese WeChat Users' Environmental Information-Sharing Behavior Based on an Integrated Model of UGT, NAM, and TPB

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Abstract: Sustainable development is a common challenge for all. Under this background, how to promote public participation in environmental communication has become an important topic. The purpose of this study is to understand the motivating mechanism behind Chinese WeChat users' environmental information-sharing behavior by taking China's unique social and cultural background into account. A comprehensive theoretical model for this study is constructed based on the uses and gratification theory, the norm activation model, and the theory of planned behavior. Through an online survey, data were collected from 526 participants to test the research model. The research results show that Chinese WeChat users' environmental information-sharing behavior is motivated by both egoistic factors (self-presentation, information seeking, and socializing) and altruistic factors (awareness of consequences and ascription of responsibility). During the behavioral decision-making process, these motivating factors impact people's actual sharing behavior via their attitudes toward the behavior, subjective norms, personal norms, and behavioral intention in various patterns. The findings are discussed from an interdisciplinary perspective of media usage, prosocial behavior, and behavioral psychology. This article not only proposes a new conceptual framework to explain social media users' behavior of sharing environmental information but also provides important theoretical and practical implications regarding motivating public participation in environmental communication on social media.

Keywords: environment; social media; motivation; information sharing; WeChat

1. Introduction

Social media is playing an increasingly significant role in environmental communication because of its user-directed character [1]. Instead of just being involved in the communication process as passive information receivers, social media users can actively share environment-related information they read or generate. For example, social media users can share the links of public service advertisements on environmental protection or news on pollution with their friends through messages. They can also broadcast their own environment-friendly lifestyles, such as using green transportation and consuming sustainably produced food on personal pages. Owing to the special structure of information diffusion on social media, users' sharing behavior accelerates the speed of information dissemination and expands the influence of shared information [2]. Presented in different formats and shared by users, various types of environmental information disseminated on social media shape the way that people perceive sustainable living. More importantly, many studies have identified that environmental information usage on social media has considerable potential in improving public environmental awareness and promoting actual pro-environmental behavior [3,4]. Although some social psychologists

criticized social media as “slacktivism” for being ineffective in providing practical offline contributions with information overflow [5], the evidence of prosocial actions initiated on social media cannot be ignored. Examples like charitable donations and snowstorm rescues developed from Twitter and Facebook indicated the feasibility of utilizing social media online interactions to promote offline prosocial behavior [6]. As a specific form of prosocial behavior, how can pro-environmental behavior be popularized in the public through social media is a question worthy of exploration but not yet well studied. For addressing questions like this, the present study attempts to start from investigating the motivations of people’s engagement in environmental information dissemination, which is expected to contribute to building up the understanding about activating social media for social benefits.

This study focuses on Chinese WeChat users’ environmental information-sharing behavior for two reasons. First, China’s current sustainable development challenges make it of special research value to encourage the public to participate in environmental topics. In the past four decades, since it adopted the reform and opening-up policy, China has achieved dramatic economic development [4]. Its prosperity has come at the cost of the environment, resulting in challenges, including carbon emissions [3,4], water contamination [7], and soil erosion [8]. In addition to policies and regulations that the government has put forward to address the environmental problems, active public participation is indispensable, because it takes joint efforts from both the government and the public to generate the best outcome of social governance [9]. Meanwhile, WeChat, the most influential social media platform in China, is becoming increasingly ubiquitous in Chinese people’s daily lives. WeChat had 1.15 billion active monthly users (those who used it no less than once during the last calendar month) by September 2019 [10]. The main difference between WeChat and other social media services like Facebook and Twitter is that WeChat users know most of their contacts personally [11]. In the past few years, WeChat’s embedded payment service (WeChat Pay, one of the largest online payment platforms in China) has further integrated it into users’ lives from various aspects, such as tourism [12], sports [13], marketing [11], public engagement [14], and even medical care [15]. To share information, WeChat users can post texts, images, and short audios/videos on “moments”, literally known as “friend space” (“朋友圈” in Chinese, similar to “homepage”), or send them directly to individual contacts or chat groups using the messaging function.

In academia, researchers have explored social media users’ information-sharing behavior from different perspectives. First, based on the uses and gratification theory (UGT), prior studies indicated that people may conduct the information-sharing behavior on social media for fulfilling a combination of needs such as hedonic, utilitarian, social, and technology gratification. It is noteworthy that gratification varies greatly according to the content that is shared and the platforms where the sharing takes place [16]. Scholars have examined various types of content, including health information [17], fake news [18], music and films [19], and knowledge [20]. However, motivations to share environmental information on social networks are less researched. Second, by adopting the norm activation model (NAM), researchers have tried to understand social media users’ information usage in prosocial scenarios. It has been proposed that communal incentives and altruistic motivations can work as psychological factors for information dissemination with regard to rumor combating [21], emergency rescuing [6], and blood donating [22]. Although scholars have explicated people’s prosocial motivations in dangerous and urgent situations [23], research remains insufficient in the field of environmental information sharing. Third, past studies have applied the theory of planned behavior (TPB) and tried to explain the motivational influences on behavior of social media use. For example, the theoretical frameworks of TPB have been modified and adapted to understand users’ information disclosure [24,25] and personal privacy protection [26] on social media. However, it remains unclear how the constructs of TPB, including attitudes, subjective norms, and perceived behavior control, are impacted by their antecedents and how they influence behavioral intention and actual behavior in the circumstance of environmental information sharing.

Therefore, given the lack of research on utilizing social-psychological theories to understand the motivational mechanism of social media users’ environmental information-sharing behavior, this study

intends to integrate UGT, NAM, and TPB to develop a comprehensive framework to fully exploit the mechanism that motivates Chinese WeChat users to share environmental information. Thus, the following three questions are proposed:

- (1) What factors of gratification motivate WeChat users' environmental information-sharing behavior?
- (2) What altruistic factors impact Chinese WeChat users' environmental information-sharing behavior?
- (3) How do the motivational factors impact the decision-making process of Chinese WeChat users' environmental information-sharing behavior?

The contribution of this study is threefold. First, unlike most prior research which mainly focused on the impact of social media use on people's environmental awareness or behavior [27], this study traces back to the antecedents of people's engagement in environmental communication and gets to the root of how to promote public pro-environmental participation on social media. Second, existing studies of social media users' sharing behavior did not pay enough attention to altruistic motivations. The present study extends the understanding of motivations behind the information-sharing behavior in a more comprehensive approach. Finally, different from studies based on global social media services like Facebook and Twitter, this study specifically focuses on WeChat users' behavior in the context of the social and cultural features of China, which can inspire further academic and practical explorations of social media information dissemination in specific societal contexts. This study is expected to provide a better theoretical understanding of social media users' participation in environmental communication and offers practical insights on how to motivate and engage the public to promote sustainability-related content on social media.

The remainder of this study is organized as follows. Section 2 presents theoretical background and Section 3 proposes a research model and hypotheses. Then, Section 4 introduces the research methods. Sections 5 and 6 present the research results and discussion, respectively. Finally, this study concludes in Section 7 by summarizing the findings and presenting theoretical and practical implications, limitations, and future research directions.

2. Theoretical Frameworks

2.1. The Uses and Gratification Theory

As one of the most prominent theoretical frameworks in media studies, UGT explains why and how a rational individual selects certain media to satisfy his/her specific socio-psychological needs in the research domain of mass communication [28]. Since the 1980s, UGT has been widely adopted in studies on traditional media usage behavior such as reading newspapers [29]. With the development of media technology, scholars have extended the application of UGT to the studies of instant messaging [30], e-mail [31], and the Internet [32]. In the past decade, an increasing amount of research has tried to use UGT to reveal social media users' behavior on specific platforms, such as Facebook, Twitter, Instagram, and Snapchat [33,34], as well as Chinese-based Weibo and WeChat [35,36].

Without a predefined set of constructs, the nomological research framework of UGT has been modified and updated alongside constant empirical explorations [37]. Existing literature has identified multiple types of gratification for sharing behavior on social media. For example, Lee and Ma [38] argued that people were more likely to share news on social media when they were driven by gratification factors such as information seeking, socializing, and status seeking. Lee and Jang [39] revealed that peoples' knowledge sharing on social media can be impacted by gratification factors such as social interaction, emotional support, and positive self-image building. In addition, Fatkin and Lansdown [6] pointed out that altruistic concerns like reciprocity may also influence social media users' information-sharing behavior. Here, this study intends to clarify what motivations drive Chinese WeChat users to share environmental information in detail based on the theoretical foundation of UGT.

2.2. Theory of Planned Behaviour and Norm Activation Model

Applying the rational choice theory, TPB is a classical theoretical framework in human behavioral studies for understanding the psychological underpinnings of volitional behavior [40]. This theory proposes that people's behavioral intention can be impacted by (1) their attitudes toward the behavior, (2) their perception of other people's ideas about whether they should conduct the behavior, and (3) their perception of the ability to control the behavior [40]. TPB suggests that behavioral intentions mediate actual behavior and the three antecedent variables [40]. TPB has been adopted to understand different types of social media usage, such as continuance usage [41], selfie-posting [42], and cyberslacking [43]. Meanwhile, modified TPB models have been utilized in the field of pro-environmental behavioral studies. For example, Oteng-Peprah et al. [44] explored households' willingness to adopt sustainable treatment technologies and identified the role of personal norms in behavior formation. Moreover, Sujata et al. [45] examined the determinants of recycling behavior, including attitudes, social norms, self-efficacy, and social media usage. These studies indicated that TPB showed good adaptability when integrated with constructs from other frameworks.

As a social-psychological model for interpreting people's altruistic intentions and behavior, NAM has been integrated with TPB to study prosocial behavior. According to NAM, an individual's behavioral intention can be explained by three key variables, namely, awareness of consequences, ascription of responsibility, and personal norms [46]. NAM has shown strong explanatory and predictive power in many prosocial scenarios, such as volunteering [47], paying for environmental protection [48], using public transportation [49], saving electricity [50], and recycling [51]. The attention that NAM pays to the prosocial/pro-environmental factors of people's behavior complements the weakness of TPB in this area. Researchers have combined NAM with TPB to understand prosocial behavior on social media. Zhao et al. [21] studied social media users' engagement in rumor combating and demonstrated a satisfactory level of prediction power of the proposed integrated model. In this study, rather than a self-interest act merely, the behavior of sharing environmental information on social media is an act that contributes to environmental communication objectively and brings indirect pro-environmental impacts. Therefore, the integration of NAM and TPB is suitable and needed to explore the factors that influence the intentions of environmental information sharing and actual behavior.

3. Research Model and Hypotheses

3.1. Research Model

Based on prior literature and the theoretical frameworks of UGT, NAM, and TPB, this study explores what factors of gratification and altruistic stimulus can impact Chinese WeChat users' environmental information sharing and how these motivational factors work in the formation of the actual behavior. Assuming people make reasonable choices, this study proposes an integrated conceptual framework in Figure 1. The development of research hypotheses is introduced next.

3.2. Research Hypotheses

3.2.1. Formation of the Behavior

According to TPB, attitudes toward a behavior describe an individual's positive or negative evaluation of performing that behavior [40]. In this study, attitudes refer to Chinese WeChat users' evaluation of environmental information-sharing behavior. When people believe that performing a certain behavior leads to positive outcomes, they tend to hold favorable attitudes toward the behavior [40]. Prior studies have explicated the effects of attitudes on information sharing in different scenarios, such as sharing management information in an organizational setting [52], sharing personal data under the effects of advertisement [53], and patients sharing health information [54]. Based on

the premise of TPB that attitudes toward a behavior predict one's behavioral intention [40], the first hypothesis is postulated as:

Hypothesis 1 (H1). *Attitudes have a positive effect on Chinese WeChat users' environmental information sharing intentions.*

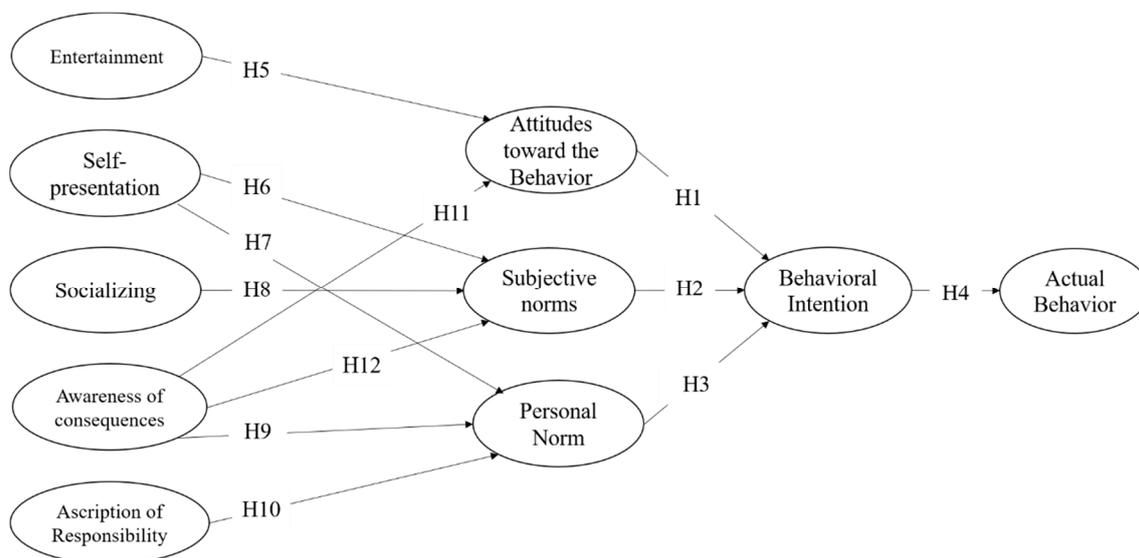


Figure 1. Research conceptual model.

Subjective norms indicate one's perception of social pressure to (not) conduct certain behavior [40]. The perception is the outcome of important referent others' judgment of whether an individual should engage in the behavior, usually from families, friends, colleges, etc. [40]. In this study, the concept of subjective norms determines to which degree Chinese WeChat users perceive that people who are important to them want them to share environmental information on the platform. Considerable explanatory power of subjective norms was found in empirical studies on social media usage [55] and online gameplay [56]. Besides that, the impacts of subjective norms on people's prosocial/pro-environmental behavioral intentions have also been recognized [57,58]. Therefore, the second hypothesis is:

Hypothesis 2 (H2). *Subjective norms have a positive effect on Chinese WeChat users' environmental information sharing intentions.*

Personal norms originate from NAM and indicate an individual's own feeling of a moral obligation to perform or refrain from specific actions [47]. Personal norms have been considered as a supplementary variable in extended TPB studies for years [59]. They showed significant impacts in pro-environmental behaviors, such as reducing clothing consumption [60], purchasing environment-friendly products [57], and adopting household greywater treatment [44]. Based on these, this study examines Chinese WeChat users' sense of personal responsibility to conduct environmental information-sharing behavior on social media. Thus, the third hypothesis is:

Hypothesis 3 (H3). *Personal norms have a positive effect on Chinese WeChat users' environmental information-sharing intentions.*

Theoretically, TPB suggests that people's behavioral intention positively indicates their actual behavior [40]. However, existing empirical studies have presented contradictory findings. Some research results showed that behavioral intention could predict the actual behaviors, such as using public transportation [49] and microblogging [61], whereas others suggested differently and identified intention-behavior gaps in behaviors like electronic waste recycling [62], solar energy usage [63], and rumor combating [21]. The relationship between behavioral intention and actual behavior can vary from one scenario to another and deserves further investigation. This study intends to examine that within the context of environmental information sharing. Therefore, the fourth hypothesis is:

Hypothesis 4 (H4). *Behavioral intention has a positive effect on Chinese WeChat users' actual behavior of environmental information sharing.*

3.2.2. Egoistic Motivations

Based on UGT and previous literature, this study examines the impact of three major types of egoistic motivations: Entertainment, self-presentation, and socializing. Related to the fulfillment of hedonic expectation, entertainment refers to the relaxation, enjoyment, escapism, and anxiety relief that people perceive when engaging in an activity or with others [64]. Entertainment has been identified as a prominent predictor of many types of social media usage, such as news sharing [38], photo sharing [65], and knowledge sharing [20]. Research results showed that 33.33% of users reported that they used WeChat for entertainment [35]. The feeling of being entertained can contribute to the users' positive evaluation of the behavior, which are the attitudes toward that behavior. Then, the fifth hypothesis is:

Hypothesis 5 (H5). *Entertainment has a positive effect on Chinese WeChat users' attitudes toward environmental information-sharing behavior.*

Related to utilitarian gratification, self-presentation refers to the satisfaction of generating certain self-images through expression and influencing others' perception and treatment of them [66]. In order to make a difference in the outcome of self-presentation, people may adjust their behavior or decisions significantly [67]. In social contexts, people may attempt to present their possession of some socially desirable traits, such as altruism, honesty, or responsibility to construct their social images [68]. The emergence of social media offers a wider platform for people to manage self-presentation, where they construct pro-social images through editing their homepages or having interactions with others. For example, Chen and Marcus [69] suggested that Facebook users disclose more positive information to maintain their friendly images. Cox et al. [70] revealed that people participate more actively in online pro-social crowdfunding campaigns when these activities can be seen by others. In order to further understand how people are driven by this type of gratification, this study examines the relationships between self-presentation and perceived social pressure and moral obligations respectively. Thus, the next two hypotheses are:

Hypothesis 6 (H6). *Self-presentation has a positive effect on Chinese WeChat users' perceived subjective norm of environmental information-sharing behavior.*

Hypothesis 7 (H7). *Self-presentation has a positive effect on Chinese WeChat users' perceived personal norm of environmental information-sharing behavior.*

Socializing refers to the gratification of achieving a sense of belonging and maintaining social relationships through interacting with others [71]. Social media has been used in the field of interpersonal communication among its users since its introduction [71]. Through getting "likes", "comments", or other types of feedback from socializing interactions, users receive others' attitudes

toward their sharing behavior. This study argues that because WeChat users can gain socializing gratification from sharing environmental information, the experience of socializing may further affect their perception of whether others want them to do that. Accordingly, the eighth hypothesis is proposed as:

Hypothesis 8 (H8). *Socializing has a positive effect on Chinese WeChat users perceived subjective norm of environmental information-sharing behavior.*

3.2.3. Altruistic Motivations

Regarding the pro-environmental feature of the environmental information-sharing behavior, this study investigates the impacts of altruistic motivating factors with the variables of NAM, awareness of consequences and ascription of responsibility. In this study, the awareness of consequences describes to what extent one is aware of the consequences if environmental information is disseminated. Ascribed responsibility signifies to what extent one perceives whether he/she is responsible for spreading the environmental information [46,72,73]. This study adopts an empirically tested mediator model, in which both awareness of consequences and ascription of responsibility influence personal norms [74]. Research results from Zhang et al. [75] supported this model by examining the antecedents of Chinese citizens' environmental complaint intentions. Theoretically, when people realized that there could be positive consequences on natural resources and the environment if they send out environmental information, such as knowledge, reminders, and warnings, they felt that they had the moral obligation to do so. Moreover, the feeling of being responsible for the consequence could make people bear the moral duty of conducting a certain behavior. Therefore, the following hypotheses are proposed:

Hypothesis 9 (H9). *The awareness of consequences has a positive effect on Chinese WeChat users perceived personal norm of environmental information-sharing behavior.*

Hypothesis 10 (H10). *The ascription of responsibility has a positive effect on Chinese WeChat users perceived personal norm of environmental information-sharing behavior.*

In addition, prior literature has explored the relationship among variables of TPB and NAM within the field of pro-environmental studies [76]. It has been pointed out that people's awareness of the adverse consequences of environmental problems directly influences their attitudes toward using public transportation [49] and choosing green accommodation [77]. Moreover, Kim and Han [78] found that people who have the knowledge on the influence of environmental problems are more likely to perceive a higher level of social pressure to perform pro-environmental consumption behavior than those with little concern about the worsening environment. These studies suggested the positive impact of environmental crisis awareness on people's environmentally friendly behavior attitudes and subjective norms. Accordingly, the last two hypotheses are:

Hypothesis 11 (H11). *The awareness of consequences has a positive effect on Chinese WeChat users' attitudes toward environmental information-sharing behavior.*

Hypothesis 12 (H12). *The awareness of consequences has a positive effect on Chinese WeChat users' perceived subjective norm of environmental information-sharing behavior.*

4. Research Methods

4.1. Measurement Instruments

Based on the research model, thirty measurement instruments were developed for examining the relationships among ten constructs, which are entertainment (EN), self-presentation (SP), socializing (SO), awareness of consequences (AC), ascription of responsibility (AR), attitudes toward the behavior (AT), subjective norms (SN), personal norms (PN), behavioral intention (BI), and actual behavior (AB). To ensure the content validity and appropriateness of the instruments, all the measurement items were adapted from previous literature and modified specifically to fit the research scenario of environmental information sharing on social media. In particular, three items of EN were adapted from Park et al. [79] and Ku et al. [80], three items of SP were borrowed from Goffman [66] and Gan [36], three items of SO were taken from Park et al. [79] and Chen et al. [81], three items of AC were adapted from Zhang et al. [75], three items of AR were borrowed from Zhao et al. [21] and De Groot and Steg [73], three items of AT were adopted from Ajzen [40] and Zhao et al. [21], three items of SN were borrowed from Ajzen [40] and Chen et al. [81], three items of PN were taken from De Groot and Steg [73] and Zhang et al. [75], and three items of BI and three items of AB were adopted from Ajzen [40]. A five-point Likert scale ranging from “1” (strongly disagree) to “5” (strongly agree) was used to measure all the items. The full list of questions is presented in Appendix A.

The questionnaire begins by introducing the study project, including research purpose, significance, and related definitions. In this study, the environmental information-sharing behavior on WeChat is defined as: Users share their received or self-generated information related to environmental friendliness/unfriendliness with others on WeChat in all ways. It includes, but is not limited to, the following situations: (1) Share links of environmental news in WeChat chat groups, (2) post texts/photos of using environment-friendly products on WeChat moments, and (3) send environmental protection tips to WeChat contacts. Next, participants' demographic information and their habits and history of using WeChat were collected. After that, the thirty measurement items were presented. All the adapted items from previous literature were translated from English into Chinese, and then translated back into English for this paper. The English translation from Chinese was checked against the original English version to ensure the Chinese translation was accurate. The initial questionnaire was then developed and tested with 50 participants in a pilot study. Finally, the questionnaire was modified in expressions and layout based on feedback from the pilot study.

4.2. Data Collection

The data of this study were collected through an online survey website in China, wenjuan.com, for the sake of effectiveness and efficiency. In less than 46 h, a total of 584 responses were collected. After eliminating those who gave wrong answers to the validity-testing questions set by the survey system (e.g., what is 1 + 8) and those who gave the same answer to all measurement items (Item 17 “For me, sharing environment information on WeChat is wise/foolish” was reverse-coded for attention-checking), 526 valid responses were collected for the following analysis. The respondents' IP addresses covered 29 of the 34 provincial-level regions of China. Most of them were from Guangdong (15.4%), Shandong (9.51%), Shanghai (9.13%), Jiangsu (7.79%), Liaoning (6.27%), Beijing (5.51%), and Zhejiang (5.51%), which showed similar proportions to the geographical distribution of Chinese WeChat users [10]. The occupations of the respondents showed good diversity, including students, industrial workers, salesmen, government employees, enterprise managers, engineers or technicians, farmers, and retirees. Regarding demographics, including age, gender, and education level and time spent on WeChat (see Table 1), the sample set is generally consistent with the 2019 Tencent WeChat annual report [10]. Therefore, the sample proves appropriate for this study.

Table 1. Sample demographics.

Measure	Items	Frequency	Percentage (%)
Gender	Male	241	45.82
	Female	285	54.18
Age	<18 years	2	0.38
	18~25 years	68	12.93
	26~30 years	165	31.37
	31~40 years	230	43.73
	41~50 years	50	9.51
	51~60 years	10	1.90
	>60 years	1	0.19
Education	Middle school or below	35	6.65
	High school	59	11.22
	Bachelor's degree	395	75.10
	Master's degree or above	37	7.03
Time spent on WeChat	<1 h/day	25	4.75
	1~21 h/day	164	31.18
	3~4 1 h/day	212	40.30
	5~6 1 h/day	47	8.94
	>61 h/day	78	14.83

5. Data Analysis

In this study, structural equation modeling (SEM) was adopted to examine the factors that impact people's environmental information-sharing behavior. SEM has been widely used in empirical studies estimating relationships between multiple independent and dependent variables [82]. This study followed the SEM analysis in two steps: (1) Examining the proposed measurement model to ensure its reliability and validity, and (2) evaluating the structure model to test the research hypotheses [83]. Furthermore, a descriptive statistical analysis was conducted on the sample data to explicate the antecedents of the sharing behavior. SPSS and AMOS software solutions were used in these statistical calculations.

5.1. Measurement Model Evaluation

The maximum likelihood estimation method was used to estimate the measurement model. The estimation starts with confirmatory factor analysis (CFA) for assessing the goodness of fit of the model. Instead of χ^2 -statistic, which is too sensitive to large sample sizes [82], the ratio of chi-square to degrees of freedom (χ^2/df) was used in this analysis according to the suggestion of Hair et al. [84]. Additionally, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), incremental fit index (IFI), standardized root-mean-square residual (SRMR), and root mean square error of approximation (RMSEA) were used collectively as model fit indices. The results of $\chi^2/df = 2.735$, GFI = 0.915, AGFI = 0.869, CFI = 0.907, IFI = 0.931, SRMR = 0.071, and RMSEA = 0.082 indicated a good fit of the measurement model as the suggested thresholds are $\chi^2/df < 3$ [24], GFI > 0.9 [85], AGFI > 0.8 [86], CFI > 0.9 [85], IFI > 0.9 [85], SRMR < 0.08 [87], and RMSEA < 0.09 [87].

Then, the validity and reliability of the measurement model were evaluated through multiple examinations. First, the internal consistency of the conceptual model constructs was tested by Cronbach's Alpha (α) and composite reliability (CR). As presented in Table 2, the multi-item constructs of the measurement model have good internal consistency with all CR and α values greater than the recommended cutoff (0.70) [88]. The correlation values between each pair of constructs were also examined. As shown in Table 1, all correlation values are positive and lower than the widely accepted threshold (0.70) [88]. Therefore, multicollinearity among the model constructs is not a major problem for this study. In addition, the convergent validity and the discriminant validity of the measurement model were assessed by average variance extracted (AVE), square root of AVE and correlation values. Since AVE values are larger than the suggested threshold 0.50 and the square root of AVE values are

bigger than the correlation values of each pair of constructs, the model shows fine convergent validity and discriminant validity [89]. These results are presented in Table 2, as well.

Table 2. Composite reliability (CR), Cronbach’s alpha (α), average variance extracted (AVE), square root of AVE, and Correlation of the constructs. (EN—Entertainment; SP—Self-presentation; SO—Socializing; AC—Awareness of Consequences; AR—Ascription of Responsibility; AT—Attitudes Toward the Behavior; SN—Subjective Norm; PN—Personal norm; BI—Behavioral Intention; AB—Actual Behavior).

Construct	EN	SP	SO	AC	AR	AT	SN	PN	BI	CR	α	AVE	$\sqrt{\text{AVE}}$
EN	-	-	-	-	-	-	-	-	-	0.719	0.848	0.656	0.810
SP	0.545	-	-	-	-	-	-	-	-	0.732	0.748	0.714	0.845
SO	0.415	0.578	-	-	-	-	-	-	-	0.794	0.776	0.705	0.840
AC	0.589	0.603	0.612	-	-	-	-	-	-	0.706	0.816	0.537	0.733
AR	0.458	0.637	0.645	0.670	-	-	-	-	-	0.819	0.827	0.658	0.811
AT	0.347	0.648	0.624	0.549	0.681	-	-	-	-	0.722	0.862	0.604	0.777
SN	0.369	0.614	0.579	0.534	0.666	0.649	-	-	-	0.751	0.916	0.581	0.762
PN	0.457	0.634	0.657	0.698	0.634	0.641	0.623	-	-	0.827	0.874	0.618	0.786
BI	0.301	0.541	0.678	0.528	0.637	0.619	0.628	0.617	-	0.768	0.797	0.567	0.753
AB	0.397	0.628	0.649	0.617	0.684	0.572	0.662	0.675	0.697	0.815	0.838	0.735	0.857

5.2. Structure Model Examination

After confirming the goodness of fit, the reliability, and the validity of the measurements, this study examined the proposed hypotheses. The results are summarized and presented in Figure 2. First, the relationships among AT, SN, BI, and AB were assessed. The coefficients (β) for the links of AT-BI, SN-BI, PN-BI, and BI-AB are 0.579 ($p < 0.001$), 0.298 ($p < 0.001$), 0.396 ($p < 0.001$), and 0.550 ($p < 0.001$), respectively. Therefore, H1, H2, H3, and H4 are supported. Then, the compound impacts of EN, SP, and SO on AT, SN, and PN were tested. The coefficients (β) for the relationships of EN-AT, SP-SN, SP-PN, and SO-SN are 0.127 ($p < 0.001$), 0.648 ($p < 0.001$), 0.389 ($p < 0.001$), and 0.446 ($p < 0.001$), respectively, providing support for H5, H6, H7, and H8. Similarly, H9, H10, H11, and H12, which represent the relationships between the variables of prosocial concerns and behavioral antecedents, are all supported. The coefficients (β) for AC-PN (0.328, $p < 0.001$), AR-PN (0.127, $p < 0.001$), AC-AT (0.233, $p < 0.001$), and AC-SN (0.437, $p < 0.001$) were all found positive and significant as expected.

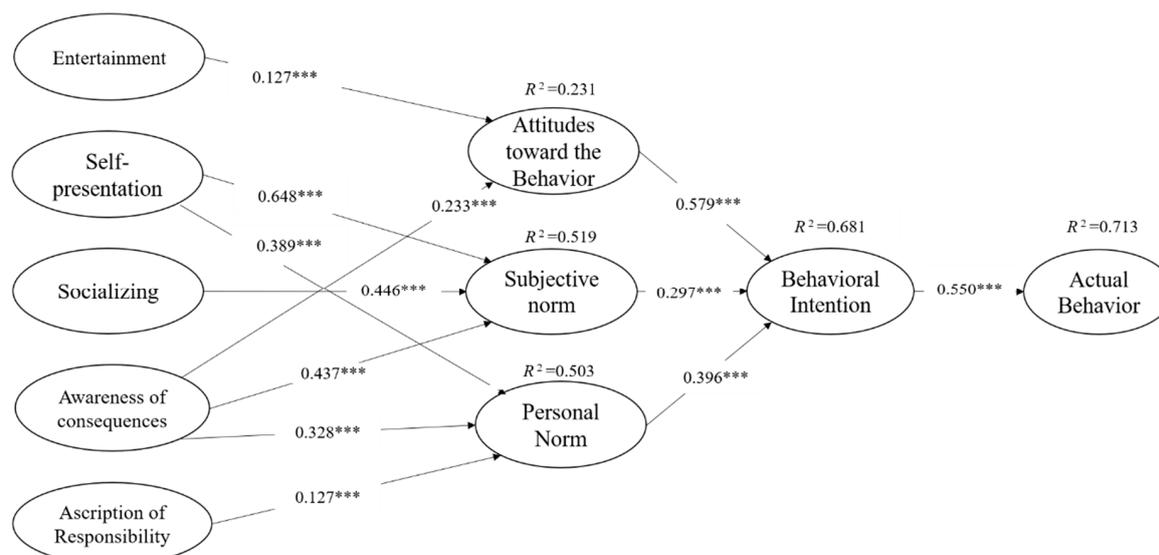


Figure 2. Research model examination results (** $p < 0.001$, R^2 is the determinant coefficient, which represents the explanatory power of the research model.).

Subsequently, the results of indirect relationships among the research model constructs were tested. Regarding the gratification factors, EN impacts BI through AT, SO impacts BI through SN, whereas SP impacts BI through SN and PN. As for the prosocial motivating factors, AR affects BI through PN, AC affects BI through all AT, SN, and PN. Through BI, AB is influenced indirectly by all the proposed antecedents. All the results of indirect impacts are displayed in Table 3.

Table 3. The indirect influence between constructs (***p* < 0.001).

Dependent Variables	EN	SP	SO	AC	AR	AT	SN	PN
BI	0.093 ***	0.111 ***	0.318 ***	0.204 ***	0.048 ***	-	-	-
AB	0.030 ***	0.421 ***	0.127 ***	0.301 ***	0.057 ***	0.319 ***	0.107 ***	0.201 ***

Meanwhile, the explanatory power of the research model was examined with the values of R^2 and presented in Figure 2. First, results show that AT, SN, and PN were explained by the proposed motivating factors to different extents. The R^2 of AT is 0.231, indicating that EN and AC explain 23.1% of the variance in users' attitudes toward environmental information sharing (AT). The R^2 of SN is 0.519, which means that 51.9% variance of people's perceived social pressure about the sharing behavior (SN) is explained by SP, SO, and AC. The R^2 of PN is 0.503, which shows that SP, SO, and AC altogether explain 50.3% variance of people's perceived responsibility of the sharing behavior (PN). Furthermore, it is found that 68.1% variance of the environmental information-sharing behavioral intention is explained by the three antecedents AT, SN, and PN, as the R^2 of BI is 0.681. Overall, 71.3% variance of the actual sharing behavior (AB) is explained by all the constructs of this model since the R^2 of AB is 0.713.

5.3. Descriptive Statistical Analysis

In order to further investigate people's behavioral motivations, a descriptive statistical analysis of the results was conducted. First, the agreement percentages and the means of all items were analyzed. The lowest percentage is EN2-strongly agree (1.711%, $N = 9$) and the highest is SP1-agree (56.844%, $N = 299$). According to the results, 67.072% of the respondents ($N = 353$) chose positive agreements (agree or strongly agree) for SP2, the highest positive consensus among all the measurement items. The mean values of all measurement items are higher than 3 (the neutral option in the questionnaire). Second, the average agreement percentage and the mean within in each research model construct were calculated. The average agreement percentage varies from EN-strongly agree (2.091%) to SP-agree (52.535%). The average means are 3.076 (EN), 3.872 (SP), 3.217 (SO), 3.459 (AC), 3.387 (AR), 3.240 (AT), 3.470 (SN), 3.325 (PN), 3.461 (BI), and 3.458 (AB). Regarding the egoistic motivations, results show that the respondents have a higher level of agreement to presenting themselves through sharing environmental information on WeChat than getting entertainment and having social interactions with others. Respondents show similar positive evaluations towards the awareness of environmental consequences and personal responsibility.

6. Discussion

From the perspective of egotistic motivations, this study has identified three types of gratification with positive influence: The desire for entertainment, self-presentation, and having social interactions with others. First, Chinese WeChat users report that they have fun when sharing environmental information and the more enjoyment they get from the sharing process, the more positive their attitudes are toward the behavior, which leads to stronger behavioral intention. This finding echoes previous literature emphasizing the significant role that entertainment plays in other types of social media usage [38,65]. Second, the motivation of self-presentation shows positive correlations with Chinese WeChat users' perceived subjective norms and personal norms, respectively. It confirms the existing finding that the satisfaction of building a pro-environmental online image motivates

information-sharing behavior [69]. Moreover, this finding specifies the impact of self-presentation on users' perceived social pressure and moral obligation toward the sharing behavior, which has rarely been discussed in related literature. The SP-SN link and SP-PN link in this context can be explained by the current pro-environmental social climate in China. As its booming economy has taken an enormous toll on the environment, China has put forward a range of environmental protection policies and awareness campaigns in order to create a social atmosphere that encourages public contribution to protecting the environment and natural resources. This social background facilitates Chinese WeChat users to share environmental content for presenting a pro-environmental self-image as they believe others would like to see their sharing and they have the responsibility to do so. Third, the gratification of socializing puts Chinese WeChat users under social pressure to conduct environmental information-sharing behavior. This finding could be related to the diverse and flexible interactions among social media users. When users share certain environmental content on WeChat, they can receive feedback in the form of likes, comments, and forwards. The feedback leads people to think that the environmental information they share is well received and other people encourage them to keep performing the action. Especially, considering the "strong ties" between WeChat contacts [11], the users may attach more value to the perceived subjective norms since the feedback comes from the people they know and care about.

From the perspective of altruistic motivations, Chinese WeChat users' awareness of consequences and ascription of responsibility significantly influence the antecedents of the environmental information-sharing behavior. First, the results show that awareness of consequences affects people's attitudes, perceived subjective norms, and personal norms regarding sharing behavior. When people have more awareness of consequences, they have a more positive evaluation of the sharing behavior and stronger perception of social pressure and moral obligation to do so. A possible explanation to these findings is the sociality of humans, that people know individual survival and development are closely connected to their surroundings. Meanwhile, through explicating the significant value of the awareness of environmental consequences, the research findings reveal people's prosociality for their social media information usage behavior. Extending prior literature that proposed the positive role of social media in prosocial information sharing, this study suggests that Chinese WeChat users choose to share environmental information partly because of their prosocial concerns of environmental consequences. Second, this study confirms the hypothesis that people's perceived personal norms of sharing environmental information increase when they feel a greater sense of responsibility for that. This study provides evidence for the argument that the ascription of responsibility can promote people's participation in pro-environmental activities regarding information dissemination.

As for the behavior formation process, this study found that Chinese WeChat users' attitudes, subjective norms, and personal norms towards sharing environmental information are vital factors driving their behavioral intention. Echoing prior studies that demonstrate variations of TPB constructs and relationships across cultures [90], it was found that Chinese WeChat users are influenced by the social pressure they perceived to share environmental information. As pointed out by Lee et al. [91], people tend to place greater weight on subjective norms when they are in a more collectivistic society comparing to those in a more individualistic society. Influenced by the Confucian philosophy, which emphasizes tight social relations, the Chinese culture values family and group obligations [92]. Therefore, the significant effect of social norms on people's sharing behavior can be influenced by Chinese collectivistic culture background. Meanwhile, viewing the findings from the perspective of pro-environmental behavior study, the key role of personal norms in sharing behavior is confirmed, indicating the rationality of promoting pro-environmental content dissemination through strengthening the public's sense of responsibility. In addition, no gap has been found between the behavioral intention and actual behavior, which means that when people want to share environmental information on WeChat, they will most probably go ahead and do it. This may be explained by the fact that sharing information on WeChat platform is a relatively simple operation, for which users do not need to pay much effort.

7. Conclusions

Social media provides a significant channel for the communication of environmental information. It is important to understand why people participate in sharing environmental information on social media. This study has developed a solid research model based on UGT, NAM, and TPB, and has analyzed data collected from 526 Chinese WeChat users. After discussing the research findings, several significant theoretical and practical implications have emerged.

7.1. Theoretical Implications

First, this study has developed and validated an environmental information-sharing behavior model concerning the entire behavioral decision-making process. This comprehensive study framework has not only demonstrated the relationship between behavioral intention and actual behavior, but has also uncovered the impacts of people's attitudes, subjective norms, and personal norms on behavioral intention. Besides, it has traced back to the motivating factors from egoistic and altruistic perspectives and extended the typical model of TPB to the context of environmental information sharing on social media.

Second, different from prior studies focusing on understanding why social media users share certain content from the gratification point of view, this study provides a new perspective to analyze the phenomena of environmental information sharing by taking prosociality into account. The research results also indicate that NAM, as a mediator model, can be successfully employed to explain Chinese WeChat users' environmental information-sharing behavior. These findings are expected to enlighten academic studies exploring prosocial or pro-environmental information dissemination on social media.

7.2. Practical Implications

First, given the findings on the factors of gratification that drive people to share environmental content, social media designers can consider taking measures in improving the user experience of entertainment, self-presenting, and socializing. For example, more intriguing audio and visual elements can be employed in the sharing process so that users can have more fun and develop more positive attitudes toward the behavior. Meanwhile, more positive reinforcement mechanisms involving other individuals or environmental organizations can be designed to encourage the self-presentation action, which may enhance the subjective and personal norms that social media users perceive. Furthermore, more diverse and real-time interactions among users can be embedded, as these may make people feel that their sharing gets attention, leading to continuous behavior.

Second, considering the important role of the prosocial motivating factors in forming the environmental information-sharing behavior, governmental-led environmental campaigns and nongovernmental advocacy groups should make efforts to enhance people's awareness of consequences and ascription of responsibility. Measures that can be taken include increasing the coverage of environmental news, promoting environment-friendly lifestyles, and developing shared values that we all should make a contribution to the harmonious coexistence of humans and the environment among the public.

Finally, as the findings of this study are based on the specific Chinese social and cultural background, they provide implications for countries/regions where economic development threatens a sustainable environment and societies where collectivist culture prevails. By referring to the findings of this study, social media designers and managers of environmental advocacy organizations can propose specific solutions to promote environmental communication according to local conditions.

7.3. Limitations and Future Work

This study has some limitations that need to be presented. First, the motivating factors the research examined are limited to the theoretical frameworks of UGT and NAM. Therefore, more potential influencing factors can be considered by future studies. Second, although demographic information

was collected for checking sample suitability, variables such as gender, age, and education level were not included in the analysis. As demographic variables may influence people's social media usage or pro-environmental behavior, future studies can specify the differences among different user groups to develop more targeted or customized environmental communication products and achieve better effects. Finally, the data collection method was limited to a self-report questionnaire. As the questions involve personality traits and the good deed of pro-environmental behavior, the results, which are derived from the respondents' feedback, may be biased and subjective [93]. Future studies should consider adopting both subjective and objective methods in order to establish a more comprehensive picture of the research subject.

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Appendix A Measurement Items

- Entertainment (EN)
Sharing environmental information on WeChat
EN1: Is entertaining for me.
EN2: Is funny for me.
EN3: Is a pleasure for me.
- Self-presentation (SP)
Sharing environmental information on WeChat, I want others to perceive me as
SP1: Environmentally friendly.
SP2: A pro-environmental person.
SP3: An environment protector.
- Socializing (SO) Sharing environmental information on WeChat, I want to
SO1: Get peer support from others.
SO2: Feel like I belong to a community.
SO3: Talk about something with others
- Awareness of Consequences
Sharing environmental information on WeChat is beneficial to
AC1: Remind the public of environmental issues.
AC2: Awaken people's awareness of environmental protection.
AC3: Promote pro-environmental behavior among the public.
- Ascription of Responsibility
Every one of us
AR1: Is responsible for helping spread environment-related news.
AR2: Has the responsibility to help promote pro-environmental ideas.
AR3: Should make efforts to participate in environmental information dissemination.
- Attitudes Toward the Behavior
For me, sharing environmental information on WeChat is
AT1: Bad (1)–Good (5).
AT2: Foolish (1)–Wise (5).
AT4: Harmful (1)–Beneficial (5).

- Subjective Norm
 - SN1: My friends think I should share environmental information on WeChat.
 - SN2: My family would want me to share environmental information on WeChat.
 - SN3: People who are important to me expect me to share environmental information on WeChat.
- Personal norm
 - PN1: I feel morally obliged to share environmental news on WeChat.
 - PN2: I feel personally obliged to share my pro-environmental behavior on WeChat.
 - PN3: I feel that I have the responsibility to share my environmentally friendly lifestyle on WeChat.
- Behavioral Intention
 - BI1: I am willing to post environment-related information on my Moment of WeChat.
 - BI2: I will share environmentally friendly suggestions with others on WeChat.
 - BI3: I would like to let others know about my pro-environmental behavior through WeChat.
- Actual Behavior
 - BI1: I have posted environmental related information on my Moment of WeChat.
 - BI2: I have shared environment-friendly suggestions with others on WeChat.
 - BI3: I have let others know about my pro-environmental behavior through WeChat.

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