



# How is the effect of social media on intention to outdoor recreations? A study using personal social connections as a moderator

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## ABSTRACT

Many researchers have identified positive effects of social media to improve recreation quality. At that time, more people recognized to be involved in social media have lower motivation for outdoor activities. Here we see two-way effects of social media, positive and negative, to participation of outdoor activities. In this study, a two-path model was built on the basis of value-expectation theory and motivation theory, and a moderating effect of social connection was considered. In this study, PLS technique (partial least square) was used to verify the model. Finally, this study finds that using social media for promoting outdoor leisure activities may have both positive and negative effects on the intention to participate. However, considering participants' social connections, engaging in social media can enhance the intention to participate in outdoor leisure activities, especially for those with high levels of social connections. In the post-pandemic era, where people have become accustomed to working from home or completing various tasks online, these research findings hold significant implications for promoting outdoor leisure activities in the post-pandemic era.

## 1. Introduction

Social Media (SM) were refer to a group of Internet-based applications that allow users to create and exchange content generated by them [1]. SM is also a source of big data [2], and these data could be words, video, or sounds. For users, SM could be used as a big database to stimulate or search for ideas for developing plans of outdoor recreation. Therefore, SM has largely change people's decision process and improve its quality. Mackenzie et al. [3] argued that increased technology use decreased opportunities that people contact with nature, meanwhile, the social media also provide opportunities to connect youth leaving in urban with natural areas. It is the economic effect of SM to recreation economy and decision. SM also influence users' psychological effects, and then their behavioral pattern. Several researches in this area mainly focus on looking for patterns of conduct, selection of destinations and services. Researchers found that SM would has significant impact on that users formulate their expectations [4,5]. Aydin & Arslan [6] point out that SM could encourage people go out for travel and create intercultural interactions. In sum, SM has substantially influence people's behaviors in many aspects including how they plan recreation activities.

Lot of studies emphasized the advantage of SM to recreation activities, however addiction to SM results in unhealthy life style was also found especially in adolescence [7,8]. Some of cases could reveal this phenomenon. Scholars [9,10] have recognized that the use

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of SM became excessive and problematic because of overuse of smartphones. Such behavioral pattern would cause many negative consequences, for example lower ability to social interactions, to be socially isolated, and problem of to be well-being [11,12]. Tükel [13] further found that the addiction behavior of college students was related to their leisure behavior. Students who participate in more sports, social and artistic leisure have lower level to addiction behaviors. Furthermore, Students who were more addict to digital services have relatively low leisure satisfaction. This implies that there is a negative correlation between the use of SM, and participation and effect of leisure and recreation.

In summary, this study found a contradiction between effects of SM for going-out plans. Some studies argued that SM would encourage people go out for recreation and create intercultural interactions, on the other side, some study argued that use of SM may cause negative consequences on outdoor recreation behavior. Here is a contradiction among recreation theories of engaging SM. In order to solve this problem, we developed a two-path model built on the basis of literature, and used social connections as a moderating variable to reconcile the theoretical contradiction. Next section would elaborate the development process of the research model. In this study, PLS technique (partial least square) was used to verified the model. Finally, Implications extended from results are also provided at the end of this article.

## 2. Hypothesis development

As stated in section 1, this study built a two-path model with a moderator, social connection, to try to explain an elaborated theory for SM in outdoor recreation field.

### 2.1. Path 1: engaging social media encourages outdoor recreations

According to Kaplan and Haenlein [1], social media and Web 2.0 and UGC (user generate contents) are concepts that appear almost simultaneously. This implicates that they are correlated each other, hence one of concepts always relate to or conclude others concepts. The typical social media is SNS (social network software), such as Facebook, Instagram et al. These SM services attract a large number of users and generates a large amount of data, so that users feel novel at any time, and then generate loyalty and stickiness to these SM. Because SM largely impact to the world, it attracted scholars' eyes. Scholars used different descriptions to SM usage as independent variable to understand its influences to the independent variable(s) in their study. For example, Pang [14] distinguished two types of using social media, active SNS (i.e. SM) use and passive SNS use. Ha et al. [15] conducted a research on the use of social media by students, and divided users into two categories, one is "instant communicators", and the other is "online content curators." In order to explore how the use of SM influence their intention to outdoor recreation, this study use the extent of SM participation to present the differences on use of SM. The operational definition could help us to solve the research question. What the participation means need to be identified. Here Steinhardt et al. [16] help this study to clarify what participation means. Steinhardt et al. [16] suggested that participation contains two subjective sub-dimensions, involvement and engagement. The scale used for measuring participation designed in this study were on the basis of the work of Steinhardt et al. [16]. It could make sure the content validity for measurement is sufficient.

Value-expectation theory is good for building theoretical relationship of SM participation to outdoor recreation intention. The value-expectation theory assumes that there is a purpose in a behavior, so that a decision maker takes the evaluation the perception of consequence as the decision criteria. In the theory, two critical elements are value and expectation. Value reflects purpose itself, while expectation means a belief of decision maker to what he/she get when the decision was exerted [17,18]. Though value-expectation theory was developed in decision-making field, it is also useful to applied to issues in recreation management [19]. In this research, value reflects the purpose of doing outdoor recreation, and the expectation means the results of doing an outdoor recreation [20]. According to the idea of value-expectation theory, the expectation to outdoor recreation could be a mediator bridge the extent of SM participation to intention to outdoor recreations, because users' expectation may be altered by SM. That YouTuber may bring lots of people to visit some destination through a hot video is a case. Because people always post only their good things on social media, for example, visiting a beautiful place, having tasty foods, or enjoying natural environment, such data (words, video et al.) in general could increase the expectation of participating outdoor recreations. Therefore, this study argued that the extent of social media participation would increase the expectation of users to outdoor recreation, and then intention to outdoor recreation. This is the path 1 in the research model. According to the arguments, H1 and H2 were built as below.

**H1.** *The extent of social media participation positively influence expectation to outdoor recreation.*

**H2.** *Expectation to outdoor recreation positively influence intention to outdoor recreation.*

### 2.2. Path 2: engaging social media reduces intention to outdoor recreations

On the other side, motivation theory is a perspective for us to understand why the SM negatively impact to outdoor recreation intention. According to motivation theory, motivation is a process of directing people to behave in certain way [21,22]. In order to satisfying needs, people would perceive stresses to take actions in certain way. So this process is driven by various human needs [23]. Motivation theory has also been applied to studies in leisure time models [24]. According to Driver and Tocker [25], the motivations to outdoor recreation are achievement, learning and sociality, independence and personal development, and relaxation. In other words, people participating outdoor recreations are looking for fulfilling these needs. When these motivations are weak or met in advance, the chance of going out for recreations is lower.

On the other hand, integrating motivation theory for outdoor recreations with SM consideration could get insight for relationship between SM and intention to going out for recreations. Kaplan, and Haenlein [1] have used a two-dimension framework, self-presentation and social presence, to analyze SM. There are six types of SM in their framework including collaborative projects (e.g., Wikipedia), content communities (e.g., YouTube), Blogs, Social networking sites (e.g., Facebook), virtual social worlds, and virtual game worlds. The common feature of these web services is more user participations or UGC (user generate contents). While users engage SM, each of these social media meets the different needs of users. Seidman [26] considered that Facebook satisfy the users' need to belongingness and self-presentation. Syn, and Oh [27] identified ten influential factors to users to use social media, these factors are enjoyment, self-efficacy, learning, personal gain, altruism, empathy, social engagement, community interest, reciprocity, and reputation. Their arguments presented that social media could satisfy the needs for learning, social engagement, enjoyment et al. Luo, and Hancock [28] also argued that self-disclosure is a critical feature for using social media and significantly influence to psychological well-being in certain way. Therefore, psychological well-being the one of ultimate purposes of leisure time may be fulfilled by SM engagements, not necessary by doing recreation activities itself.

On the basis of synthesizing previous research, this study argued that motivation of outdoor creations (i.e. the process) may be decreased by that people pre-satisfied the needs of outdoor recreations, such as achievement, learning and sociality, independence and personal development, by engaging social media. Furthermore, the intention to outdoor recreations may also be weaken as motivation weaken when needs for outdoor recreations was pre-satisfied through engaging SM. This is the path 2 in the research model. Related hypothesizes were established as blow.

**H3.** The extent of social media participation positively influences pre-satisfaction on outdoor recreations motivation.

**H4.** Pre-satisfaction on outdoor recreations motivation negatively influence the intention to outdoor recreations.

### 2.3. Moderating effect of social connection

This study expects the SM users' social connection to moderate the relationships between expectation to outdoor recreations, and pre-satisfaction on outdoor recreation and intention to outdoor recreation. In terms of relationship between expectation and intention to outdoor recreation, the moderating effect of social connection is negative. This assertion is proposed on a basis of leisure constrains theory. There are structural, intrapersonal and interpersonal constraints to hinder people from outdoor recreation [29]. In the path 1, expectation to outdoor recreations is a mediator variable positively impact to intention to going out, while the social connect would decrease interpersonal and intrapersonal constrains. Thus, the moderating effect to social connection was inferred as that higher social connection stronger the relationship between expectation and intention to outdoor recreations.

On the other hand, social connection also moderates the relationship between pre-satisfaction on outdoor recreation and intention to outdoor recreation. This effect was considered as negative in this research. On the same theoretical foundation in the inference to moderating effect in path 1, higher social connection results in lower interpersonal and intrapersonal constraints, thus the chance of going out for recreation is higher given the same level of pre-satisfaction on outdoor recreation, and vice versa. Therefore, higher social connection would weaken the relationship between pre-satisfaction on outdoor recreation and intention to outdoor recreation. That means the moderating effect is negative.

In sum, path 1 and path 2 present how that users engage in SM impact to the intention to outdoor recreations. One is a positive path, and the other is a negative path. Both of two paths are supported by existing literature and to be contradiction. This study tries to use a moderating variable, social connection, to reconcile the contradiction. This study argues that the outdoor recreation behavior of people with more social connection tend to be explained by path 1, on the other side, the behavior of people with less social connection tend to be explained by path 2, while they engage in SM at the same level. Thus, the hypothesis relating to moderating effect of social connection on path 1 and path 2 were established as below.

**H5a.** Social connection positively moderate the relationship between expectation to outdoor recreation and intention to outdoor recreation.

**H5b.** Social connection negatively moderate the relationship between pre-satisfaction of outdoor recreation motivation and intention to outdoor recreation.

## 3. Research method

### 3.1. Research design

In order to verifying the research model, this study conducted a survey research to collect data randomly to analyze by PLS (partial least square). The process for the study contains three steps: (1) designing a scales with reliability and validity to measure latent variables in research model, (2) to collect data, and (3) to analyze data by appropriate tools. The process and relevant data were presented in following, which describe the design and pretest of scales the study used, sampling process, sample structure, and introduction to statistical tool.

### 3.2. Questionnaire design and pretest

The questionnaire items used in this study were designed according to tis definitions through brainstorming or adopted from

literature in order to operationalize the constructs [30]. Each variable was measured by 3–5 items designed as Likert 5-scale. SM participation and intention to outdoor recreations both were measured by 3 general items. The items such as “frequency”, “time” of using SM in a period were used to measure SM participation, and general items such as “how is the intention to joint outdoor recreation” et al. were used to measure intention to outdoor recreations. Social connection was measured by the breadth and closeness of participants’ interpersonal connections, the scale was designed partially through brainstorming, and partially adopted from literature. Participants in this study were asked “in general, how many people do you frequently keep contact.”, how is the frequency you contact to friends in a week.”, and “spend to with a close friend [31]” (1 = not at all to 5 = very much). Items to expectation to outdoor recreations assessed the attitude to outdoor recreations by 3 general items designed through brainstorming according to the definition. Pre-satisfied on outdoor recreations was measured by second-order factors, the design of second-order factors referred to the theory of motivation to recreation [25]. Thus, these second-order factors are achievement, learning and sociality, independence and personal development, and relaxation. Each second-order factors were measured by items designed according to their definitions. The final variable in the model is the intention to outdoor recreations also measured by 3 general items reflecting responders’ attitude to outdoor recreations.

In order to making sure of validity and reliability, the items were tested by pretest collecting a small-size sample. In total 75 questionnaires were collected. Through quick screen, in the data set there were 20 invalid responses. Finally, 55 valid responses for our pretest. These responses were coded in numbers for statistics analysis. The confirmatory factor analysis (CFA) was used to verify how the items could converge to specific concepts, on the other side, the reliability analysis was used to verify the reliability of each scale by calculating and evaluating the value of Cronbach’s alpha. The results of pretest are presented in Table 1.

According to the result of pretest, it showed that the validity of each variable is qualified in terms of the criteria that factor loading of each item tested in a specific construct is greater than 0.5 [32,33]. This is an evidence to means the scales used in this study could correctly measure the constructs, which satisfies the requirement of validity. Meanwhile that  $\alpha$  (Cronbach’s alpha) of each construct is greater than 0.7 is categorized as reliable enough to further analysis [34]. This means the scales we used were stable, which satisfies the requirement of reliability. Therefore, the scales used to measure variables in research model were tested as valid and reliable to conduct a larger-scale survey for collecting data to test the hypothesis.

### 3.3. Sampling and sample structure

After testing the measurement as valid and reliable, this study conducted a survey through an online survey service for data collecting. The online survey system can let us set the sampling conditions. The sampling conditions we set are those who have used social media for more than 3 years and are over 17 years old. Totally, we got 209 responses, and deleted 33 invalid responses. Thus there were 176 valid responses for analysis. Table 2 showed the sample structure to examine whether the sample is representative to population. The sample structure showed that the percentage of male responses was 47.7 %, while the percentage of female responses was 52.2 %. It matches the general population structure in Taiwan, therefore the sample could be considered as well representative to the overall population. Our sample generally concentrated on the age groups of 18–24 (34.6 %), 25–34 (28.9 %), and 35–44 (15.9 %).

### 3.4. Statistical tool: PLS

Because of some reasons we choose the PLS (partial least square), one type of SEM developed by Lohmoller [30], as the analytical tool in this research. The PLS could establish and verify the relationships among latent variables. The significant advantage of PLS

**Table 1**  
Pretest.

Variables	Items	Means	S.D.	Factor loading	Cronbach’s alpha
SM participation	3	4.0968	0.70023	0.786	0.840
		4.0323	0.79515	0.858	
		4.0000	0.81650	0.738	
Social connection	2	4.0323	0.75206	0.827	0.799
		4.0323	0.79515	0.836	
		3.5806	0.80723	0.794	
Expectation to outdoor recreation	3	3.4516	0.72290	0.873	0.793
		3.6774	0.83215	0.862	
		3.8611	0.86519	0.801	
achievement	3	3.8333	0.88500	0.886	0.823
		3.8472	0.85542	0.891	
		4.0764	0.78518	0.912	
learning and sociality	2	4.0278	0.82737	0.912	0.800
		3.8972	0.80488	0.859	
		3.6875	0.99276	0.859	
independence and personal development	2	3.9306	0.81638	0.915	0.751
		3.7639	0.94600	0.915	
		3.7742	0.71692	0.935	
relaxation	2	3.6129	0.88232	0.891	0.801
		3.8065	0.70329	0.805	
		3.8065	0.70329	0.805	
Intention to outdoor recreation	3	3.7742	0.71692	0.935	0.845
		3.6129	0.88232	0.891	
		3.8065	0.70329	0.805	

**Table 2**  
Sample structure.

No.	Dimensions	Groups	Frequencies	Percentages
1	Gender	Male	84	47.7 %
		Female	92	52.2 %
		Sum	176	100 %
2	Age	≤17	10	5.6 %
		18–24	61	34.6 %
		25–34	51	28.9 %
		35–44	28	15.9 %
		45–54	20	11.3 %
		≥55	6	3.7 %
		Sum	176	100 %

against to original SEM is that it estimated models on a basis of on nonparametric statistics. In other words, it does not assume the sample distribution as normal distribution, nor need to require large sample. This is a crucial advantage of PLS against to others SEM methods when the sample is relatively small [35,36], or the focal concepts and ideas in a theory is developed at early stage. Therefore, in terms of maturity of our theory and sample size we chose PLS as an analytical tool in this study to take advantage to providing meaningful finding.

#### 4. Results

PLS combined the factor analysis and path analysis as others SEM, which ensure that the structural model was established on a basis of goodness of assessments. In other words, assessments are acceptable, and then structural model is meaningful. Therefore, the following section presented the results of estimations of measurement models and the structural model.

##### 4.1. Validity and reliability of measurement models

In order to ensure the measurement models were acceptable for estimating a structural model, this study followed the criteria proposed by scholars to test the reliability and validity of measurement models, and presented the relevant numbers in Table 3. In terms of validity, convergent validity and discriminant validity are two necessary conditions in PLS analysis. Convergent validity is sufficient when two criteria are matched. First, t-value of each item should be significant at  $p < 0.001$  level. According to Table 3, the first requirement is fulfilled. When the average variance extracted (AVE) of each latent variable is greater than 0.5, the second criterion is sufficient [37]. In addition to convergent validity, discriminant validity also need to be matched, which means that each construct in the model can be clearly distinguished among constructs. In terms of discriminant validity, the criterion proposed by Fornell and Larcker [38] required that the square root of the AVE of each construct is greater than correlations between the construct and other constructs. According to the results presented in Table 3, the measurement models designed for measuring variables are qualified to further analyze the structural model. Table 4 shows the comparisons between correlations and roots of AVE of each variable. The results also support that discriminant validity was established. Table 5 present the HTMT value among variables.

The composite reliability is also required to be qualified to further construct a reliable structural model. The criterion of composite reliability is that the composite reliabilities of each measurement model should be great than or at least equal to 0.75. According to the value of composite reliabilities showed in Table 3, the measurement models are qualified in terms of composite reliability. In sum, the results generated from PLS for validity and reliability support that the measurement models are good enough for structural model analysis.

**Table 3**  
Validity and reliability of measurement models.

No.	Variables	Items	Factor loading	t-value	Composite reliability	Average variance extracted
1	SM participation	SMP1	0.893	49.105	0.880	0.711
		SMP2	0.800	16.461		
		SMP3	0.834	30.549		
2	Social connection	SC1	0.790	19.952	0.874	0.777
		SC2	0.739	14.410		
3	Expectation to outdoor recreation	EXP1	0.888	62.816	0.894	0.644
		EXP2	0.862	40.076		
		EXP3	0.826	26.115		
4	Pre-satisfied of outdoor recreation	PRES1	0.882	50.897	0.935	0.783
		PRES2	0.972	264.281		
		PRES3	0.938	105.393		
		PRES4	0.728	17.014		
5	Intention to outdoor recreation	INT1	0.837	63.797	0.906	0.763
		INT2	0.905	41.674		
		INT3	0.877	34.044		

**Table 4**  
Comparisons between correlations and roots of AVE of each variable.

Variables	SMP	SC	EXP	PRES	INT	SC*EXP	SC*PRES
SMP	0.843						
SC	-0.363	0.881					
EXP	0.444	-0.731	0.802				
PRES	0.420	-0.781	0.770	0.884			
INT	-0.301	0.705	-0.755	-0.780	0.873		
SC*EXP	-0.011	0.059	-0.217	-0.154	0.145	1.000	
SC*PRES	-0.020	0.022	-0.156	-0.107	0.102	0.813	1.000

**Table 5**  
HTMTs among variables.

Variables	CON	EXP	INT	PREA
EXP	0.448			
INT	0.588	0.910		
PREA	0.905	0.962	0.908	
SMP	0.384	0.538	0.865	0.755

4.2. Structural model

Next step is estimating the structural model to verify the hypothesis in this research (see Fig. 1). The coefficients for each path and R squares of dependent variables were showed as Fig. 2. Overall the results of structural model estimation supported our hypothesis in terms of directions and statistical significances of each coefficient. H1 was supported ( $\beta = 0.444, p < 0.001$ ), which means that people use social media more would increase their expectation level to outdoor recreation. The increasing level of expectation to outdoor recreation sequentially significantly increased the intention to outdoor recreation, which means H2 was supported ( $\beta = 0.384, p < 0.01$ ). Therefore, the path 1 for our theory of outdoor recreation and social media is significantly supported by the data collected on a basis of a qualified research design.

The path 2 in our theoretical model was also supported by the data. The path coefficient between SMP and PRES is 0.44 ( $p < 0.001$ ), which means that people who used social media more could lead to pre-satisfaction on outdoor recreations. Hence, H3 was supported.

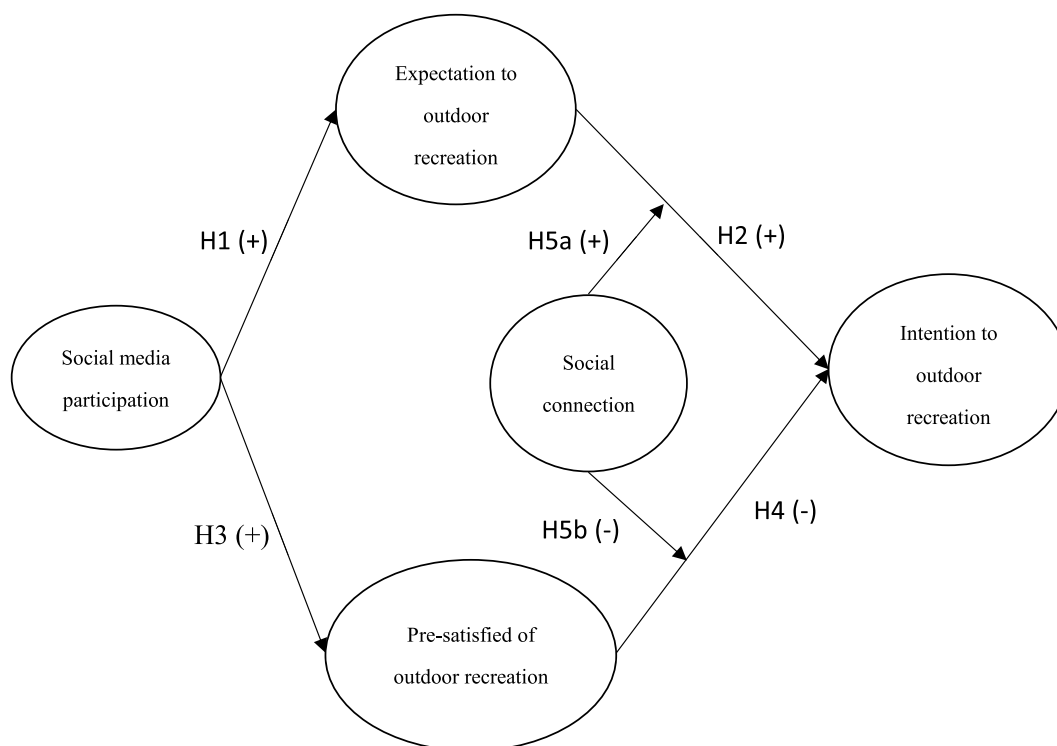


Fig. 1. Research model.

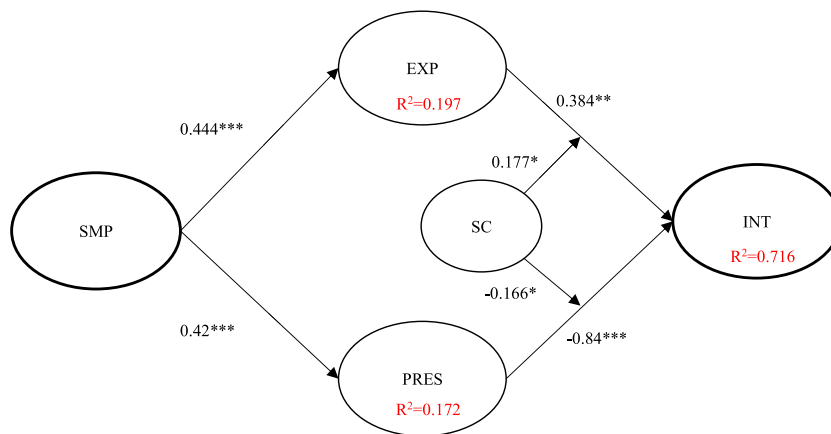


Fig. 2. Structural model.

The path coefficient between PRES and INT is  $-0.84$  ( $p < 0.001$ ), so that H4 was strongly supported by data. According to the result of hypothesis testing for H4, the authors could say that people achieved pre-satisfaction on outdoor recreation through social media, for example, watching the video for travels or outdoor activities, would really decrease intention to going out for outdoor recreations. This could be one of negative effect of digital recreations on outdoor recreations.

According to results of structural model estimation, the moderating effects of SC (social connection) on path 1 and 2 were also supported at some level of statistical significance. SC significantly and positively moderated the relationship between EXP and INT ( $\beta = 0.177$ ,  $p < 0.05$ ), on the other side, SC significantly and negatively moderated the relationship between PRES and INT ( $\beta = -0.166$ ,  $p < 0.05$ ). According to the results, H5a was supported, which means that people who possess more social connections were driven more to do outdoor recreations by the expectation for outdoor recreation. On the other side, H5b was also supported, which means that stronger social connections would weaken the relationship between PRES and INT. It means that people who possess more social connections maybe not easier to be locked by digital devices. So people with social connections have more intention to outdoor recreation than people with fewer social connections, while they engaged social media at the same level. In sum the estimated structural model supported all the hypothesis the authors proposed in this study.

## 5. Discussions

Based on the structural model estimation of this study, all our research hypotheses are supported by the data. The research model suggests that engaging in social media to obtain information about outdoor leisure activities, including professional leisure knowledge, players' experiential sharing, and attraction promotions, will enhance individuals' expectations of participating in outdoor leisure. Simultaneously, it also leads to a pre-satisfaction effect due to information acquisition. Increased expectations of outdoor leisure lead to a higher inclination to participate, while pre-satisfaction with outdoor leisure reduces the inclination to participate. Therefore, individual engagement in social media may either increase or decrease the inclination to participate in outdoor leisure activities.

To further understand the impact of participating in social media on the inclination to participate in outdoor leisure activities, this study introduces social connections as an intervening variable for analysis. The results show that social connections significantly positively moderate the relationship between outdoor leisure expectations and participation inclination, while negatively moderating the relationship between pre-satisfaction and participation inclination. Consequently, social connections amplify the influence of outdoor leisure expectations on the inclination to participate, while reducing the impact of pre-satisfaction on the inclination to participate in outdoor leisure activities.

In summary, this study suggests that using social media for promoting outdoor leisure activities may have both positive and negative effects on the intention to participate. However, considering participants' social connections, engaging in social media can enhance the intention to participate in outdoor leisure activities, especially for those with high levels of social connections. In the post-pandemic era, where people have become accustomed to working from home or completing various tasks online, these research findings hold significant implications for promoting outdoor leisure activities in the post-pandemic era.

## 6. Conclusions and implications

Recently social media has become a tool to fulfill leisure needs and a popular marketing tool in leisure, recreation and tourism field [39]. However, as we also see the people who used social media more often behave as "otaku" or "homebody". That give us a reason to call into question of that effect of using social media could promote outdoor recreations or should be considered the action may result in negative effect on outdoor recreation promotion in society. Therefore, how the social media influenced outdoor recreation promotion is the question in this study. Through the literature, we found contradict arguments about this question. This study aims to solving the question. The two arguments were explained by appropriate mediators introduced from relevant theories. The path 1 was



developed based on the value-expectation theory, which is a path represented the positive effect on intention to outdoor recreation. On the other side, the path 2 augured that potential outdoor recreation participants may be pre-satisfied of their needs to reduce outdoor activities, so the path present the negative effect of social media on intention of outdoor recreations.

Besides the two-side effects of social media were identified, a critical moderator, social connection, reconciling two paths also identified. This study found that the effect of SM to intention to going out depends on users' social connections. This finding may let us use social media to promote outdoor recreations more effectively. For example, messages appear in social media which aiming to connect members each other such as Facebook would be more effective than messages appear in such social media emphasize personal exposure such as YouTube. In addition to matters of marketing activities, this study also contributes to theoretical development. As mentioned before, some scholars considered using social media could positively improve the intention to outdoor recreations, on the other side, others argue otherwise. We reconciled these two contradict arguments.

In addition to reconciling differing opinions about social media, the findings of this research also hold significance for promoting outdoor leisure in the post-pandemic era. Rice et al. [40] have confirmed that COVID-19 has led to a significant reduction in outdoor leisure activities, resulting in a decline in people's well-being. Given the lifestyle changes caused by the pandemic, many individuals may not be able to return to their previous way of life, such as working from home. Therefore, it is essential to improve people's lifestyles through marketing and promotion. Considering the post-pandemic lifestyle, which is centered around staying at home and utilizing the internet, it is necessary to understand the impact of social media on outdoor leisure.

The research results suggest that the more social media is used, the earlier outdoor leisure needs are satisfied, and expectations for outdoor leisure are heightened. This, in turn, may either increase or decrease the inclination towards outdoor leisure. However, when considering social connections, having more social connections enhances the impact of expectations on outdoor leisure inclination while reducing the impact of early satisfaction on outdoor leisure inclination. Therefore, if there are more social connections, a higher frequency of social media usage is more likely to enhance the inclination towards outdoor leisure. Conversely, if social connections are limited, a higher frequency of social media usage may reduce the inclination towards outdoor leisure. Based on these findings, this study suggests that when using social media as a marketing tool to promote outdoor leisure, priority should be given to considering the characteristics of the social media platform. Social media platforms that facilitate social connections will significantly contribute to the promotion of outdoor leisure activities.

## 7. Limitation and future study

In the future, there are some issues which may be addressed to more understanding relationships between social media and outdoor recreation intentions. First, how users' demographic influence effects of social media on outdoor recreation intentions. By the time goes by, the first generation of social media users is getting older, and more and more youth engage in social media, so the age distribution to users on social media is also getting wider. Different generations may behave differently on social media, so the age and other demographic may become critical variables to understand behaviors related to outdoor recreations in virtual worlds.

Second issue is how the social media innovations influence its effects on outdoor recreations. This research is based on existing types of social media, in the future new social media with new value propositions, new operation models et al. may be emerged. Scholars should keep going on such new social media to understand how it influences users' behavior on outdoor recreations. The author considers that social media is always an issue to promotion on outdoor recreations.

## Data availability statement

Data will be made available on request.

## CRediT authorship contribution statement

**Wei-Tien Hung:** Writing – original draft, Investigation, Formal analysis, Data curation, Conceptualization. **Gwo-Bao Liou:** Visualization, Project administration, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2023.e22268>.



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