Mobile device use in mountain hiking experience affecting leisure constraints negotiation

by

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ABSTRACT

The purpose of this dissertation was to empirically explain the role of mobile device use in hiking activity and its impact on hikers' leisure constraints and negotiation behaviors. To achieve this, one research project was designed and executed; its results are presented here in three separate papers. To test and analyze research hypotheses, data were collected from a sample of 399 mountain hikers visiting Canada's Rocky Mountains (i.e., Banff and Jasper National Parks, as well as Peter Lougheed, Canmore Nordic Centre and Spray Valley Provincial Parks) and in South Korea (i.e., Bukhan and Seorak National Parks). Partial least squares structural equation modeling (PLS-SEM) was used as the main analysis technique throughout the dissertation. Additionally, a cultural comparison between Canada and South Korea via moderation analysis (PLS-MGA) was also attempted. The separate frameworks and results of the three studies are as follow:

The first study in this dissertation (Chapter 2) used the constraint-effects-mitigation model as a framework to examine leisure constraints-negotiation theory among mountain hikers. The relationships among leisure constraints, leisure negotiation, leisure motivation, and hiking participation were examined. The leisure constraints had a significant negative effect on both negotiation and hiking participation. Negotiation had a significant positive effect on hiking participation and showed a partial mediating effect in the model. Motivation had a strong positive effect on negotiation and a relatively small negative effect on hiking participation.

The statistical moderation between the two cultures could not be performed but some contrasting path relationships were detected. The South Korean sample produced a significant negative relationship between constraints and hiking participation. The Canadian sample revealed a significant positive relationship between negotiation and hiking participation.

The second study in this dissertation (Chapter 3) used the extended version of the unified theories of acceptance and use of technology 2 (UTAUT2) model as a framework to examine and improve the model for mountain hiking context. A safety expectation construct was added to extend the UTAUT2 model to tailor its application to mountain recreation contexts. Also, the actual use of mobile devices was separated into three stages (before, during, and after hiking) to capture various aspects of mobile device use for hiking activity. Performance expectancy, facilitating condition, habit, and safety expectancy had a significant positive effect on behavioral intention. Behavioral intention had significant positive effects on all three stages of actual use. No significant moderation effect on mobile device use by age and culture was found. In terms of path relationships, performance expectancy's effect on behavioral intention was only positively significant in the South Korean sample. The negative impact of effort expectancy, the positive impact of facilitating condition, and the positive impact of habit were only significant in the Canadian sample. Safety expectancy's positive strong effect was significant across the cultures.

The third study in this dissertation (Chapter 4) explored a theoretical model that integrated the constraint-effects-mitigation model and the extended UTAUT2 model used in the first and second studies of this dissertation to examine the role of mobile device use on mountain hikers' constraints and negotiation process. Hiking constraints had a significant negative effect on use of mobile devices, negotiation, and hiking participation. Motivation had a positive effect on negotiation and had a negative effect on hiking participation. The path from UTAUT2 through use of mobile devices to negotiation confirmed full mediation. Negotiation had a significant positive effect on hiking participation. In terms of cultural sub-group analysis, the negative paths from constraints to both hiking and mobile device use were only significant in the South Korean sample. Motivation's effect on mobile device use was only significant in the Canadian sample.

In conclusion, a facilitating role of using mobile devices for hiking activity on leisure constraints and negotiation process was empirically confirmed in this dissertation. More importantly, the safety-related functions of mobile devices were found to be the strongest factor in this research context, namely mountain hiking trails. The overall discussion and conclusion are summarized in Chapter 5 of this dissertation.

PREFACE

This dissertation is an original work by Sung Bum Chun. This research received ethics approval from the University of Alberta Research Ethics Board, under the project titled "Mobile device use in mountain hiking experience affecting leisure constraints negotiation: Integrating UTAUT2 and constraints-effects-mitigation model" (ID: Pro00086089, approved on August 6, 2019). This research also received ethics approval from the Yonsei University's Institutional Review Board (IRB) on the August 3, 2020 (No. 7001988-202008-HR-663-03).

Permission to collection data in Banff and Jasper National Parks was granted by Parks Canada (Research and Collection Permit # JNP-2019-33497, Aug. 13, 2019). Permission to collect data from provincial parks located in Kananaskis Country provincial parks was granted by Alberta Parks (Parks Research and Collection Permit and/or Wildlife Research Permit and Collection License #017160132, Aug. 13, 2019).

This dissertation is formatted in three publishable papers (Chapter 2, 3, and 4). I was the lead author and mainly responsible for data collection, data analysis, and manuscript composition for all the three studies in the dissertation. Dr. Elizabeth Halpenny and Dr. Chul Won Lee were involved in the conceptualization of the theories, data collection, and contributed to manuscript edits. Dr. Justin Jeon and Dr. Jinmoo Heo also contributed to manuscript edits. This study was financially supported by the grant of the academic promotion project of the Korean Society for

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Chapter 1

INTRODUCTION

Our lifestyles are changing faster than ever due to rapid information communication technology (ICT) development. Mobile devices like smartphones have triggered a huge paradigm shift in the last decade, changing how people think and behave. Our leisure life is no exception. People think and behave differently in leisure participation contexts when they become aware of technology tools or information that can enable them to engage in leisure activities that, in the past, were difficult or not possible. To examine the impact of mobile digital technology, this study aims to re-examine leisure constraint and negotiation theory with a focus on mobile devices' role in influencing leisure activity. The leisure activity chosen for this study is mountain outdoor recreation, specifically hiking, because the influence of mobile devices reaches beyond urban environments and because nature settings such as mountain landscapes are located where the use of mobile digital technology could be limited.

In reviewing existing literatures around the research topic, the following research gaps were found~~:~~

1) Although the concepts of leisure constraints and negotiation have been popular research topics in leisure studies, these theories or models have not been thoroughly tested in different populations. Further, the

constraints-negotiation model as an overarching theory, which simultaneously considers constraints and negotiation, has been examined much less than studies solely focused on constraints. For instance, Hubbard and Mannell (2001) came up with four competing models for leisure constraints-negotiation theory and concluded that the constraints-effects-mitigation model was the best fit with their study data, thus providing the strongest theoretical explanation, but the study population was limited to corporate employees. Loucks-Atkinson and Mannell (2007) confirmed the utility of Hubbard and Mannell's (2001) model but their study was also limited to populations with fibromyalgia syndrome. Moreover, studies by Son, Mowen, and Kerstetter (2008) and White (2008) only partially supported Hubbard and Mannell's (2001) constraints-effects-mitigation model and yet, these studied only include older adults and outdoor recreationists, respectively. Studies by White (2008), Wilhelm Stanis, Schneider, and Russell (2009), and Kimmm (2017) appear to be the only studies that have focused on park visitors' leisure constraints-negotiation process using Hubbard and Mannell's (2001) model. Hence, there is a need for constraint-negotiation theory assessment in different contexts and a re-examination of the order of exogenous variables' influence, as well as their relationships with additional relevant factors, that affect leisure activity engagement. Equally importantly, there is a serious knowledge gap in outdoor recreationists' constraints and negotiation behavior (Hinch & Jackson, 2000; Ito, Kono, & Walker, 2018; Kono, Ito, Walker, & Gui, 2020; Lu & Campbell, 2008). This study looked into this gap.

2) As new technology permeates our daily lives, research on human acceptance of emerging technology becomes more important. One of the most reliable theoretical models to assess use and acceptance behaviors toward technology is the UTAUT (Unified Theories of Acceptance and Use of Technology) model by Venkatesh, Morris, Davis and Davis (2003). Although the UTAUT model has been frequently used to predict use of software or digital devices in work environments, few researchers have applied this model to non-work contexts, particularly leisure. Mobile devices have become an undeniably crucial part of our life nowadays, however, we lack understanding about how they have changed our thinking and behavior, especially with regards to leisure. The most active researchers studying this topic in leisure studies have focused on tourism (Chun, Lee, & Kim, 2012; Kim, Park, & Morrison, 2008; Kim & Law, 2015; Lepp, 2014; No & Kim, 2014; Oh, Lehto, & Park, 2009; Tussyadiah & Wang, 2016; Van Winkle, Bueddefeld, MacKay, & Halpenny, 2017; Wang, Park, & Fesenmaier, 2012). Nevertheless, there hasn't been any study, which specifically examined use and acceptance behavior toward mobile devices or their applications in mountain outdoor

recreation settings. The impact of mobile technologies reaches beyond urban environments where most research has been focused, to rural, mountainous areas, thus it is necessary to expand the diversity of contexts in mobile devices studies. Technology's impact on nature and mountain recreation has been debated among different research fields. The positive aspects of using ICT in outdoor recreation include making people feel safer and more comfortable, encouraging people to try an experience they otherwise might not try, and facilitating access to the information regarding these activities. However, there are negative aspects of ICT use for mountain recreation. For example, self-reliance, an essential skilled developed in mountain recreation, has been replaced by technological-reliance; less experienced visitors rely too much on technology leading to riskier behavior. Additionally, the use of mobile devices leads to an electronically mediated experiencing of nature which can result in psychological distancing from nature and reduced opportunities to connect, appreciate, and benefit from natures' restorative properties (Dickson, 2004; Martin, 2017; Martin & Pope, 2011). However, the debate among different studies so far has focused on non-empirical literatures. There are very few studies that empirically examine what positive or negative impacts technology has on mountain or nature outdoor recreation experiences and this study will investigate this gap.

According to the aforementioned gaps, my dissertation carried out three studies with different research models. Study 1 assessed a leisure constraints negotiation model in a mountain hiking setting. Study 2 assessed use and acceptance behavior toward mobile devices among mountain hikers through the UTAUT2 model. Building from studies 1 and 2, study 3 assessed a newly integrated model using the variables from studies 1 and 2 to examine how using mobile devices impact constraint and negotiation factors among mountain hikers.

Throughout all three studies, cultural differences between Canadians and Koreans were tested. There are two main reasons for this cross-cultural comparison. First, both Canadians and Koreans are fond of mountains and consider mountains as one of the most popular and valuable leisure places in their countries. Seventy percent of South Korea is covered by mountains. Mountain hiking has been the most popular leisure activity for Koreans in the last decade (Gallup Korea, 2015), and one in three Koreans go hiking more than once a year. This shows that hiking has become part of Koreans' identity (Harlan, 2014). This love of mountains appears to be the same for Canadians as well. Outdoor activities and being close to nature are also important to a large segment of Canadian society; it starts early in youth at children's camps, continues with schools and universities through outdoor programs, and extends into later years with family camping trips (Henderson & Potter, 2001). However, differences also exist. The countries differ in parks management styles. According to Shin, Jaakson, and Kim (2001) and Lee and Bürger-Arndt (2008), Korean forest management is focused on physical resources and inventories installation, whereas western countries like Germany are more focused on programs with various recreation activities and environmental education. Maintaining ecological integrity while providing the opportunity for recreational enjoyment is a major emphasis for Canada's national and provincial parks (Dearden, Rollins, & Needham, 2016).

Cultural differences can also be observed when it comes hiking motivations between Eastern and Western cultures, and deserving of further investigation. Based on Markus and Kitayama's (1991) study of independent and interdependent self-construal tendency between Eastern and Western populations, Walker, Deng, and Dieser (2001) identified some differences in motivations for outdoor recreation between Chinese and Euro-North American park visitors. Relatedly, Asian outdoor recreation culture has the concept of "forest bathing" (Shinrin-Yoku) and has been studied by scientists from several academic fields; forest bathing is an outdoor recreation activity that is distinctive from Western culture's use of forests (Hansen, Jones, & Tocchini, 2017; Tsunetsugu, Park, & Miyazaki, 2010).

Furthermore, digital infrastructure availability is quite different between two countries. Korea is considered as small country with fast internet and advanced ICT, whereas, area-wise Canada is one of the largest countries in the world, which makes it difficult for internet service providers to cover rural areas. As a result, South Korea is one of the top digitally-connected countries in both coverage and speed of mobile phone service connectivity (Smith, 2016), whereas Canada has achieved a moderate level of mobile connectivity with relatively expensive consumer costs. South Korea's advanced ICT is due to decades of government-led ICT investment (Choung, Hameed, & Ji, 2012; Larson & Park, 2014). In contrast, Canada's ICT sector has experienced less support and slower growth (Sharpe, 2005; Van Ark, Inklaar, & McGuckin, 2003). Furthermore, height and size of mountain for hiking is quite different between two countries: the highest mountain in Korea is 1950 meters and the highest mountain in Canada is 5956 meters. Travel time to mountain top of most mountains in Korea, where good internet connection is available, is about 3-5 hours, whereas, it is not unusual that it takes days to hike to the mountain top in Canada, where internet connection is limited. These differences likely to produce impacts on people's ICT-related experiences and behaviors this study looked into these differences between Koreans and Canadians.

An additional gap in knowledge that this study tackled is the role of leisure motives in affecting constraints and negotiation. Hubbard and Mannell's (2001) model considers motivation as an important variable – but there is still a lack of clarity in its role and function. Early work by Jackson, Crawford, and Godbey (1993) suggested "both the initiation and outcome of the negotiation process are dependent on the relative strength of, and interactions between, constraints on participating in an activity and motivations for such participation" (p. 9). Since this study focused on outdoor recreation contexts, the Recreation Experience Preference (REP) scale was employed to measure hikers' motivations, similar to studies by White (2008) and

Wilhelm Stanis, Schneider, and Russell (2009). The REP scale is often used in the outdoor recreation motivation studies that examine participants' desire for satisfying outdoor recreation experiences (Manfredo, Driver, & Tarrant, 1996; Moore & Driver, 2005).

OBJECTIVE AND RESEARCH QUESTIONS

Study 1

Objective:

- To test the relationship between leisure constraints, negotiation, motivation, and participation and see what framework or model can explain Canadian and Korean mountain hikers' constraints-negotiation behavior.

Research questions:

1. Is the constraint-effect-mitigation model, which includes leisure constraints, negotiations, and leisure motivations, suitable for predicting mountain hiking participation?
2. How do leisure constraints and motivations influence negotiation strategies and participation in mountain hiking?

3. How does negotiation mediate relations among constraints, motivation, and participation in mountain hiking?

4. What are the differences and similarities between Canadian and Korean mountain hikers?

Study 2

Objectives:

- To test and extend the UTAUT2 model in order to improve its prediction of recreation activities in outdoor recreation settings such as mountain hiking.

- To examine the differences of mobile device use and acceptance between Canadians and Koreans.

This study explored the effects of cultural differences including digital and outdoor recreation attitudes. It also explored how the level of mobile digital infrastructure availability affects mountain hikers at each country settings. Finally, it examined differences among mobile device use for the three distinct phases of a hiking trip: preparation, during, and after the hiking activity.

Research questions:

1. Is the UTAUT2 model suitable for predicting mountain hikers' use and acceptance (BI) of mobile devices for mountain hiking activities?

2. Does adding a safety expectancy variable to UTAUT2 improve the model's prediction of mobile device use and acceptance (BI) for mountain hiking?

3. What are the differences and similarities between Canadians and Koreans?

4. What are the differences and similarities among age groups?

5. To what degree does each UTAUT2 variable predict mobile device use for mountain hiking?

6. Do the UTAUT2 variables' prediction of mobile device use for mountain hiking vary with country context?

7. Do UTAUT2 variables prediction of mobile device use for mountain hiking vary with time stages of use (i.e., before, during, and after)?

Study 3

Objective:

- To develop an integrated model that examines the relationship between use/acceptance of mobile devices and leisure constraints and negotiation strategies among mountain hikers. The model tried to ascertain the degree to which mobile technology like smartphones or tablet PCs facilitate leisure participation by assisting users.

Research questions:

1. How well does an integrated model, containing the constraint-effect-mitigation model and UTAUT2 model, predict mountain hikers' participation, when the use of mobile devices is incorporated into the model to investigate impacts on leisure constraints negotiation strategies?

2. Do the UTAUT2 variables and use/acceptance of ICT effectively mediate the relationship among constraints, motivation, and negotiation in predicting mountain hiking participation?

3. Does the integrated model demonstrate that using mobile devices for mountain hiking facilitates participation as a mediating tool or path?

4. What are differences and similarities between Canadians and Koreans?

5. What are differences and similarities between highly experienced and unexperienced mountain hikers?

DATA COLLECTION AND ANALYSIS

Participants and data collection

Hikers and trail users among Banff and Jasper National Parks in Canada, and Seorak and Bukhan National Parks in South Korea were targeted for the survey.

Sampling method were non-probability and convenience sampling. In order to diversify the sample, data was collected during both weekdays and weekends. While all the people who were encountered by surveyors in the mid- and back-country hiking trails were asked to participate, every 5th person that surveyors encountered in the front-country, mainly at trail head parking lots, were asked to participate. All the surveys took place at public locations (e.g. trail heads, parking lot, scenic lookouts, visitor centers). Approximately 200 participants from each country were asked to fill out the questionnaire during their outdoor recreation activities. According to Hair et al. (2016), the criteria for sample size in PLS-SEM model with ten arrows pointing at constructs and 5% of significant level detecting small effect size was recommended as 189 samples. All the models of my studies have around 10 constructs relationships.

Analysis

PLS-SEM (Partial Least Squares Structural Equation Modeling) was used to analyze the research model in my dissertation. In recreation studies a CB-SEM approach has been more widely applied than PLS-SEM, but PLS-SEM should be considered more frequently, as it offers a number of advantages. First, unlike CB-SEM, PLS-SEM can consider both reflective measurement and formative measurement models (Hair, Hult, Ringle, & Sarstedt, 2016). In reflective measurement models, the items are representation of their constructs and the causality is drawn from constructs toward the items. In formative measurement models, each item of the construct is a specific aspect of the construct; it has a distinct influence on the construct. Items used to represent reflective measurement constructs are interchangeable and highly correlated, whereas items for formative measurement construct are essential, uncorrelated, and supposedly have all the aspects forming the construct. There are theoretical concepts and their latent variables that may be considered as formative rather than reflective but so far vast majority of the studies have been treated them as reflective measurement by choosing CB-SEM as analysis method. In this study, leisure constraints variables were treated as a formative measurement model inspired by Kyle and Jun (2015) and Kono, Ito, and Loucks-Atkinson (2018). Thus, PLS-SEM will be employed.

Second, PLS-SEM analysis is based on ordinary least squares (OLS) regression rather than the maximum likelihood (ML) approach and estimates path relationships that maximize R-square values. This characteristic makes PLS-SEM the preferred method when developing theory or exploring path relationship models (Hair et al., 2016). Study 3 of my dissertation was designed to explore path relationships by integrating two already existing models. PLS-SEM is a more suitable approach for statistical analysis of relationships than its counterpart.

In summary, Study 1 employed PLS-SEM for the analysis of data, due to treating leisure constraints measurement as formative, which was analyzed along with other reflective measurements variables in the model. Study 2 also employed PLS-SEM for data analysis because the sub-constructs of UTAUT2 could be explained better when uncorrelated to each other since the original model assessment by

Venkatesh et al. (2003) also used PLS modeling. Study 3 was analyzed with PLS-SEM to treat leisure constraints measures as formative, explore variable relationships, and to integrate path models.

DISSERTATION FORMAT AND OUTLINE

This dissertation consists of five chapters, which are Introduction (Chapter 1), Study 1 (Chapter 2), Study 2 (Chapter 3), Study 3 (Chapter 4), and Overall Discussion and Conclusion (Chapter 5). Chapters 2, 3, and 4 have exclusive introduction, literature review, methods, results, discussion, and conclusion each on their own. Chapter 5 contains the overall conclusion and implication of three studies' empirical results.

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Chapter 2

LEISURE CONSTRAINTS AND NEGOTIATION AMONG MOUNTAIN HIKERS: CONSIDERING MOTIVATION THROUGH CONSTRAINTS-EFFECT-MITIGATION MODEL

INTRODUCTION

Outdoor recreation in mountain and forest contexts has been studied across various scientific fields including sport and leisure, tourism, public health, and forestry. A number of studies regarding constraints to participation in mountain outdoor recreation or natural parks have been published (e.g., Elomba & Koo, 2015; Fredman & Heberlein, 2005; Fredman, Romild, Yuan, & Wolf-Watz, 2012; Ghimire, Green, Poudyal, & Cordell, 2014; Kerstetter, Zinn, Graefe, & Chen, 2002; Nyaupane, Morais, & Graefe, 2004; Shinew, Floyd, & Parry, 2004; Shores, Scott, & Floyd, 2007; Stanis, Schneider, Chavez, & Shinew, 2009; Walker & Virden, 2005; Wilhelm Stanis, Schneider, & Russell, 2009; Zanon, Doucouliagos, Hall, & Lockstone-Binney, 2013). These studies were done in response to, first, the need to investigate inequality in outdoor recreation participation by gender, age, socio-economic status, race, and other factors, after Crawford and Jackson (2005) had called for the need for development of the theory (Shores et al., 2007). Second, as constraints research may be more valuable in specific contexts such as outdoor recreation than leisure activities in general (Hultsman, 1995; Kerstetter et al., 2002), the continued investigation of leisure constraints in outdoor recreation contexts provides researchers and practitioners with a better understanding of park users' complex motivations and decision-making processes (Godbey, Caldwell, Floyd, & Payne, 2005; White, 2008). The research of Virden and Walker (1999) and Walker and Virden (2005) are good examples that offer some of the most comprehensive and practical results among related studies. Walker and Virden's research has helped both researchers and practitioners of parks understand what barriers most frequently constrain park visitors and in what order.

Jackson, Crawford, and Godbey (1993) further developed the concept of constraints into constraints-negotiation theory. According to Jackson et al. (1993), constraints and their negotiation process should be considered along with motivation. As they wrote, "both the initiation and outcome of the negotiation process are dependent on the relative strength of, and interactions between, constraints on participating in an activity and motivations for such participation" (p. 9). However, research on the role of motivation within constraints-negotiation theory has been overlooked as only a few constraints-negotiation studies in leisure research have considered all three factors together: constraints, negotiation, and motivation (Hubbard & Mannell, 2001). Furthermore, constraints-negotiation studies regarding mountain use and outdoor recreation specifics are even more uncommon (Hinch & Jackson, 2000; Lu & Campbell, 2008).

While the leisure research field needs more constraints-negotiation investigations to strengthen the consistency of its theoretical models, there is a noticeable lack of cultural variation in leisure constraints studies and also constraints-negotiation studies (Dong & Chick, 2012; Guo & Schneider, 2015; Ito, Kono, & Walker, 2018). A systematic review of non-Western and cross-cultural leisure research by Ito, Walker, and Liang (2014) identified 6% of these examined leisure constraints theory. Dong and Chick (2012) noted that significantly more cross-cultural and comparative leisure constraints research need to be done in order to generate truly generalizable leisure constraints models. Researchers such as Virden and Walker (1999); Walker, Deng, and Dieser (2001); and Ito et al. (2018) have identified the differences in the use of nature and outdoor recreation between Western and Eastern cultures in terms of their leisure motivation and participation. Their ideas were based on Kitayama, Duffy, and Uchida's (2007) concept of self-construal. According to the self-construal theory, Westerners tend to have a more independent self-construal whereas Asians especially tend to have more interdependent self-construal. Additionally, Asian outdoor recreation culture has the concept of "forest bathing" (*shinrin-yoku*), a distinctive cultural practice that has been studied by scientists from several academic fields, who have noted that such a concept differs from Western culture's use of forests (Hansen, Jones, & Tocchini, 2017; Tsunetsugu, Park, & Miyazaki, 2010). These studies highlight the need to study cross-cultural leisure constraints, negotiation, and motivation research in outdoor recreation contexts.

LITERATURE REVIEW

Leisure constraints and negotiation

The concept of leisure constraints emerged in the 1980s in the leisure studies field, and it was generally described as being all the factors that interfere with or limit participation in leisure activities (Jackson, 1988). More specifically, leisure constraints are defined as "factors that are assumed by researchers and/or perceived or experienced by individuals to limit the formation of leisure preferences and/or to inhibit or prohibit participation and enjoyment in leisure" (Jackson, 2000, p. 62). Crawford, Jackson, and Godbey (1991) suggested a hierarchical model of leisure constraints, theorizing that constraints are overcome in the order of intrapersonal constraints, interpersonal constraints, and structural constraints. Intrapersonal constraints involve personal psychological states such as the fear of certain things or attributes related to self-image. Interpersonal constraints have to do with interactions with others and coordinating personal resources to participate in leisure activities such as when a person is unable to manage time with their partner. Lastly, structural constraints are factors that intervene between leisure preference and participation such as barriers of time and money (Raymore, Godbey, Crawford, & von Eye, 1993). More recently, however, some scholars have raised concerns about the appropriateness of a hierarchical order of leisure constraints. In response, researchers such as Godbey, Crawford, and Shen (2010) suggest that the constraints model could work in a circular way rather than a hierarchical way.

There are also debate around whether the traditional three-factor leisure constraints model is sufficient to explain or predict the theory. Some studies suggest that more diverse dimensions are needed to better understand leisure constraints (Casper, Bocarro, Kanters, & Floyd, 2011; Ito et al., 2018; Jackson & Rucks, 1995). This debate is also prevalent in cross-cultural or non-Western leisure constraints studies maintaining that the three-category constraints theory is more compatible with Western culture whereas non-Western culture may align better with a more diversified categorical theory (Dong & Chick, 2012; Kono, Ito, Walker, & Gui, 2020). For example, Dong and Chick (2012) utilized an eight-factor constraints model with factors such as personal issue, lack of money, family issues, service quality, lack of time, transportation, stress, and lifestyle. Their results indicated that the eight-factor model was more advantageous in understanding Chinese cultural participants compared to the traditional model.

Instead of maintaining the assumption that constraints automatically result in non-participation in leisure activities, researchers identified a process of negotiation and suggested that this negotiation determines participation (Mannell & Kleiber, 1997). Leisure constraints negotiation can be defined as "the effort of individuals to use behavioral or cognitive strategies to facilitate leisure participation despite constraints" (Schneider & Wilhelm Stanis, 2007, p. 392). Negotiation strategies consist of six different subfactors, which are changing leisure aspirations, improving finances, changing interpersonal relations, energy management, skills acquisition and time management. Loucks-Atkinson and Mannell (2007) indicated that leisure constraints negotiation is the process of overcoming constraints by using both personal and social resources. Crawford and Jackson (2005) later indicated that it is crucial to develop and extend the constraints-negotiation theory to address gender, socioeconomic status, culture, and other factors. This call for focused research was addressed by McKay, Messner, and Sabo (2000), along with several studies that focused on inequality between the genders in leisure participation (Cronan, Shinew, Schneider, Stanis, & Chavez, 2008; Ho et al., 2005; Jackson & Henderson, 1995; Scott & Jackson, 1996). Differential leisure participation by different races and ethnicities has been another critical issue and several leisure constraints studies have focused on this topic (Ghimire et al., 2014; Shinew et al., 2004; Stanis et al., 2009). In fact, cultural differences in constraints studies was identified as a dominant theme in Zanon et al.'s (2013) meta-analysis of constraints to park visitation. However, although with some exceptions (e.g., Son, Mowen, & Kerstetter, 2008; Stanis et al., 2009), leisure constraints-negotiation studies have less often examined individual characteristics (e.g., age and gender) and recreation in outdoor contexts.

Most of the previous studies regarding leisure constraints and constraints-negotiation that were mentioned above are based on Western cultures. The leisure research field needs to expand its study of topics and subjects to other cultures around the globe in order to truly strengthen our understanding of human behavior and leisure-related psychology. Culture shapes one's beliefs and perspectives, which can result in people from different cultures having different perceptions of the same event (Ito et al., 2018). Kitayama et al. (2007) suggested that self-construal serves a key role in interpreting similarities and differences between different cultures. Self-construal can be understood as how an individual considers themselves in relation to others. Markus and Kitayama (1991) believed that self-construal determines people's thoughts, feelings, and motivations (Ito et al., 2018; Walker et al., 2001). According to Markus and Kitayama (1991), people from North America and Western Europe are more likely to hold independent self-construal, whereas people from Asia are more likely to hold interdependent self-construal. The characteristics of independent self-construal values are unique: expressing one's thoughts, and promoting one's own goals. Interdependent self-construal, on the other hand, sets value on belonging, fitting in, and promoting others' goals (Walker et al., 2001). Naturally, the concept of self-construal is considered to be a useful framework for understanding leisure constraints and constraints-negotiation structures in cross-cultural research (Kleiber, Walker, & Mannell, 2011). Although the lack of leisure constraints and constraints-negotiation research in non-Western cultures has been pointed out (Ito et al., 2018; Ito et al., 2014), there are some studies that indicate cultural differences exist for both constraints theory (Chick, Hsu, Yeh, & Hsieh, 2015; Dong & Chick, 2012; Walker, Jackson, & Deng, 2007) and constraints-negotiation theory (Guo & Schneider, 2015). For instance, a factor analysis by Dong and Chick (2012) indicated, for a Chinese sample, an eight-factor constraints model consisting of personal issues, family issues, lack of money, service quality, lack of time, transportation, stress, and lifestyle is more appropriate than the three-factor constraints model of Jackson et al. (1993). Ma and colleagues employed the constraints-negotiation model with some variation in factors while trying to find a more suitable theoretical structure for the Taiwanese population. By extension, Ito et al. (2018) inductively developed new factor typologies for constraints and constraints-negotiation theories based on Japanese and Canadian populations and compared them with conventional typology divisions. Their effort has inspired further cross-cultural leisure constraints-negotiation studies including this one.

Leisure constraints, negotiation, and motivation as an over-arching theory

Drawing from a sample of workplace recreationists, Hubbard and Mannell (2001) further developed the leisure constraints negotiation model by considering motivation as a variable and studying its relationship with constraints and negotiation variables. They tested four competing models with different compositions using structural equation modeling. The first model was the *independence* model, where constraints, negotiation, and motivation affect leisure participation separately. In the *negotiation-buffer* model, negotiation plays the role of a moderator on the negative relationship between constraints and leisure participation, while motivation affects negotiation and participation positively. In the *perceived-constraint-reduction* model, negotiation serves as an antecedent variable to constraints in a negative way, and it is directly and positively associated with leisure participation. Lastly, the *constraint-effects-mitigation* model suggests that constraints directly and negatively affect participation while mediated positively through negotiation. The study established that the constraint-effects-mitigation model explained the relationship the best. The constraint-effects-mitigation model indicates that constraints actually activate negotiation strategies, and the greater used of negotiation strategies, increased participation followed. The model also suggested motivation was an important factor; when highly motivated to achieve health and enjoyment, individuals would expend greater effort to negotiate recreation constraints (Hubbard & Mannel, 2001). The four structural modeling are shown in Figure 2.1.

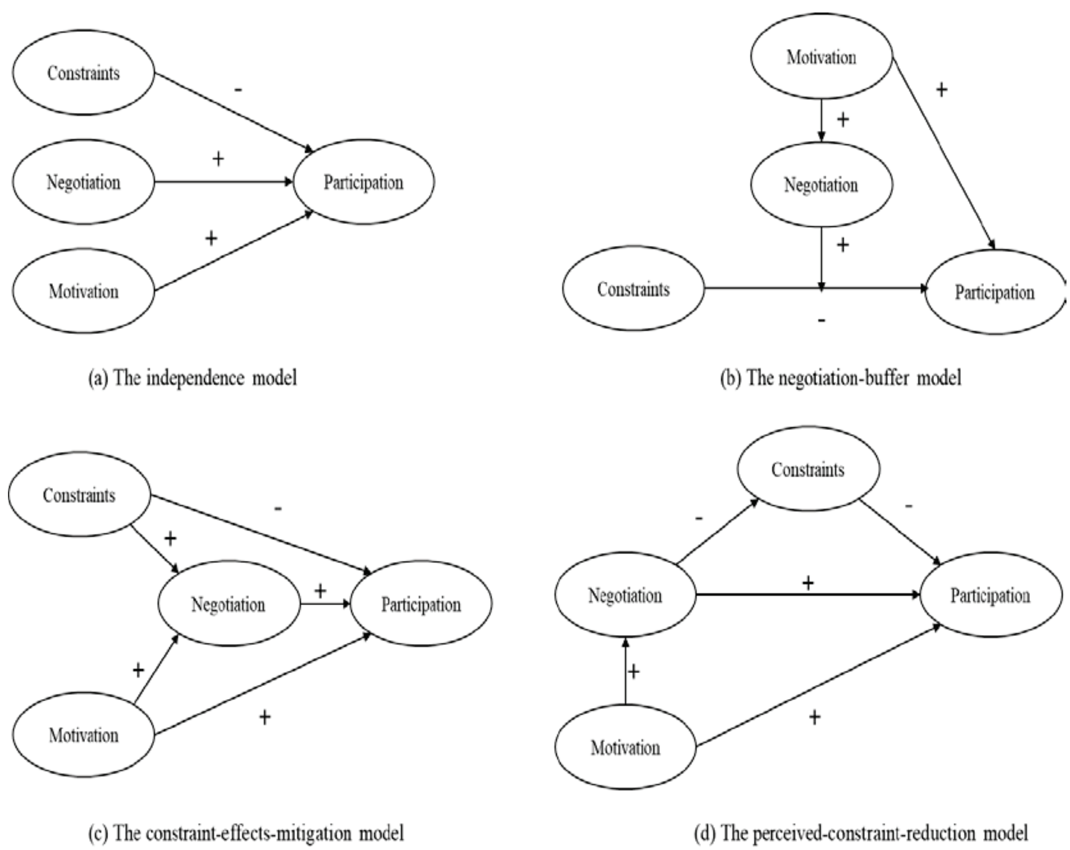


Figure 2.1. competing leisure constraints negotiation models (Hubbard & Mannell, 2001)

However, as opposed to Hubbard and Mannell's (2001) proposition that negotiation partially mediate relations between constraints and participation, Son, Mowen, and Kerstetter's (2008) study found that constraints do not have any effect on negotiation but only negatively relate to participation. This outcome can be interpreted as negotiation strategies and resources may only act as facilitators of participation rather than negotiators of leisure constraints. Son et al. (2008) re-specified and named it the dual-channel model. In fact, Samdahl (2005) argued that if all the variables regarding leisure such as constraints and motivation can be explained by negotiation strategies, it may not be a valid construct for understanding leisure choices, while Hubbard and Mannell (2001) argued that negotiation works both as a facilitator and a negotiator. In explaining the debate, Son et al. (2008) noted that their sample of individuals aged 50 years old and older possibly resulted in variable relationships that may not be represented in the general population. Furthermore, Loucks-Atkinson and Mannell (2007) and Jun and Kyle (2011) also partially supported the constraint-effects-mitigation model and discovered that negotiation had the largest effect on participation. However, these studies studied very specific populations, individuals experiencing fibromyalgia syndrome patients and recreational golfers.

The recent study by Kono, Ito, Walker, & Gui (2020) discovered that the independence model is the strongest prediction model among the competing leisure constraints-negotiation models suggested by Hubbard and Mannell (2001). This model is characterized by constraints, negotiation, and motivation directly and separately predicting participation. They also found that the dual-channel model proposed by Son et al. (2008) showed all significant prediction of participation for both Japanese and Canadian respondents participants. While their results suggested that the dual-channel model performs well as an explanation model since its hypothesized relationships all found to be significant, the model is not a good predictive model since non-significant relationship can increase predictive power (Kono et al., 2020; Shmueli, 2010). The mixed performance of these different leisure constraints-negation models suggests the critical need for research that further explores relationships between these variables and their prediction of leisure participation.

Leisure constraints, negotiation, and motivation in outdoor recreation

Some leisure constraints and negotiation research has been completed in parks and outdoor recreation contexts. While studies such as those of Stanis, Schneider, and Pereira (2010) and Guo and Schneider (2015) investigated park visitors' constraints and negotiation strategies without a structural model, the others employed structural models to test constraints-negotiation theory and most of them referenced Hubbard and Mannell's (2001) models that include the motivation as a variable (Kimmm, 2017; Schneider & Wynveen, 2015; Schroeder, Fulton, Lawrence, & Cordts, 2012; Son, Kerstetter, & Mowen, 2009; White, 2008; Wilhelm Stanis et al., 2009). In particular, studies that utilized the constraint-effects-mitigation model to explore outdoor recreation participation are especially relevant to this study (e.g., Kimmm, 2017; Schroeder et al., 2012; Son et al., 2009; White, 2008; Wilhelm Stanis et al., 2009).

The structural model test conducted for White's (2008) study indicated that greater motivation to participate in outdoor recreation would facilitate the user's negotiation strategies and resources to enable them to overcome constraints. Constraints also had a positive effect on negotiation strategies in congruence with Hubbard and Mannell's constraint-effects-mitigation model. However, negotiation had a small and non-significant relationship with outdoor recreation participation, contrary to the constraint-effects-mitigation model. Stanis et al. (2009) studied leisure-time physical activity (LTPA) and the constraints-negotiation of park visitors. Their structural assessment supported the original constraint-effects-mitigation model, only with weaker and less significant results (i.e., $p < 0.1$). Son et al. (2008) also examined constraints-negotiation and LTPA among park visitors who were 50 years old and older, but developed a dual-channel model that they modified from the constraint-effects-mitigation model. They confirmed the positive relationship between negotiation and LTPA, along with an association of constraints to LTPA and motivation to negotiation. However, the dual-channel model theorized that constraints have no effect on negotiation and that there is no effect of motivation on LTPA.

Schroeder et al. (2012) studied outdoor recreation hunters' leisure constraints-negotiation and participation specifically based on the constraint-effects-mitigation model (Hubbard & Mannell, 2001). Only partial relationships were significant in the model, these are constraints to negotiation and negotiation to participation. The effect of motivation was only indirectly significant toward participation.

Although urban park visitors in Seoul, South Korea were assessed rather than mountain park visitors, Kimmm (2017) successfully employed the constraint-effects-mitigation model to examine outdoor recreationists' constraints-negotiation and park visitation. The result supported the original model except for the relationship between constraints and negotiation (constraint management), which was rejected with a *p*-value of 0.08.

The accumulated previous studies regarding leisure constraints, negotiation, and motivation discussed above suggest that constraints-negotiation theory delivers highly variable explanatory performance. This was observed for recreational activities and types of participants. Due to this inconsistency, constraints-negotiation theory requires additional assessment to improve understanding of the relationships with different samples and measures (Schroeder et al., 2012; Wilhelm Stanis et al., 2009). Hence, a leisure constraints negotiation model that includes a motivation variable still needs more research that targets various types of participants and situations to generate a clearer understanding.

The Recreation Experience Preference (REP) scale as a motivation factor

Motivation has been defined as a person's psychological needs and wants that decide his or her behavior and action (Dann, 1981; Kim, Lee, Uysal, Kim, & Ahn, 2015; Pearce & Caltabiano, 1983; Pearce & Lee, 2005). It has been suggested that hiking or other nature-based activities are engaged in for somewhat different motivations than other leisure activities (Haas, Driver, & Brown, 1980; Kim et al., 2015). In tourism research, for instance, theories such as the push-pull model (Crompton, 1979), travel career ladder (Pearce & Lee, 2005), and functional theory (Katz, 1960) are employed to explain motivation, whereas for outdoor recreation and nature-based activities researchers commonly use the Recreation Experience Preference (REP) scales to measure and understand outdoor recreationists' motivations to visit mountains and nature (Kim et al., 2015; Manfredo, Driver, & Tarrant, 1996; Raadik, Cottrell, Fredman, Ritter, & Newman, 2010; Walker et al., 2001; White, 2008; Wilhelm Stanis et al., 2009).

The Recreation Experience Preference (REP) scales were the first to conceptualize recreation activities as behaviors that are instruments to achieve particular psychological and physical goals (Driver & Tocher, 2019; Knopf, Driver, & Bassett, 1973). By extension, the recreation experience was later defined as a package of psychological outcomes that are expected from outdoor recreation participation. The REP scales were developed through exploratory factor analyses over two decades inductively rather than being entirely rooted in theoretical concepts such as motivation or self-determination. This inductive foundation of REP has been criticized for having a poor theoretical basis (White, 2008), but it could also be a strength since the scale better reflects the outdoor recreationists' actual motivations. In fact, Driver and his colleagues invented the scales over the years through a number of research projects using methods such as focus groups, personal interviews, and mail-based survey questionnaires (Driver, Tinsley, & Manfredo, 1991; Walker et al., 2001). The full version of the REP scales includes 19 factors, which are as follows: achievement/stimulation, autonomy/leadership, risk-taking, equipment, family togetherness, similar people, new people, learning, enjoying nature, introspection, creativity, nostalgia, physical fitness, physical rest, escaping personal-social pressure, escaping physical pressure, social security, teaching-leading others, and risk reduction, many of which are further divided into two to seven sub-factors (Manfredo et al., 1996; Walker et al., 2001). Nevertheless, most of the studies using REP scales do not use the full scales but only use four or five factors that are suited to each study's context and participants (Kim et al., 2015; Walker et al., 2001; White, 2008; Wilhelm Stanis et al., 2009). White (2008) used four factors of motivation: achievement, enjoy nature, escape, and socialize. Walker et al. (2001) utilized five factors, which were nature/tranquility, introspection, social security, autonomy/independence, and autonomy/alone. Wilhelm Stanis et al. (2009) used five factors: enjoy nature, health, social interaction, solitude, and achievement. More recently, Kim et al. (2015) examined four factors of motivation, which were enjoying the natural environment, escaping from daily life, pursuing a new type of travel, pursuing a healthy life, and pursuing intimacy.

Despite the REP scales' popularity among researchers based in North America, they are rarely used to examine outdoor recreationists from cultures outside of North America (Walker et al., 2001). Although there are few exceptions (i.e., Kim et al., 2015; Raadik et al., 2010; Stewart, Harada, Fujimoto, & Nagazumi, 1996; Walker et al., 2001), the application of the REP scales has clearly not been done enough for them to be generalized across other cultures.

Outdoor recreation and nature use between cultures

Virden and Walker (1999) identified and used two different theoretical approaches regarding interaction between a person and the natural environment: the opportunity structure/goal-directed approach and the sociocultural approach. These theoretical approaches toward person-natural environment interactions were based on work by Saegert and Winkel (1990) and Williams and Patterson (1996). They described person-environmental relations with three theoretical approaches. The first was the adaptive paradigm, which assumes that a person's behavior toward nature is based on the goal of biological and psychological survival (Virden & Walker, 1999). The second approach was the opportunity structure/goal-directed paradigm, which views the meaning of the environment as having an instrumental value to goal-directed behavior and economic goals (Williams & Patterson, 1996). The last approach was the sociocultural paradigm, which is related to "(1) how meaning both structures and is structured by the environment, and (2) the link between macroscale sociocultural and economic factors and more social- and individual-level environmental concerns" (William & Patterson, 1996, p. 512). While the opportunity structural/goal-directed approach focuses on the use of the natural environment to achieve people's practical goals, the sociocultural approach differs by focusing on what meaning people give to nature (Virden & Walker, 1999). The former structural/goal-directed approach could be useful to understand nature-human interaction among outdoor recreationists in general. The latter sociocultural approach is more appropriate for understanding person-natural environment interaction by comparing different cultures such as Western culture against Eastern culture. Thus, a combination of the two approaches will be especially useful when seeking to understand natural outdoor recreation behavior in general and culturally simultaneously.

The very early European Americans used to view deserts and wilderness as useless wasteland. This cultural viewpoint was influenced by the Judeo-Christian tradition. Today's meaning of the natural environment is that which the European Americans possess, of a place that is a rather attractive destination, began from Romanticism in the nineteenth century (Nash, 2014; Virden & Walker, 1999). A majority of North Americans now view wilderness as a place to challenge themselves, a place of escape, refuge, freedom, and even beauty. However, we have limited understanding about the meaning of the natural environment for non-

European American cultures. Even residents of Northern Europe have different points of view regarding the natural environment. Raadik et al. (2010) suggested that Swedish outdoor recreationists fundamentally hold a different views of nature use from Anglo European. Kaltenborn, Haaland, and Sandell (2001) observed that traditional outdoor recreation in Scandinavian Sweden reflects a far simpler idea than the commercialized outdoor recreation activities of North America. The Scandinavian term *friluftsliv* means "free-air life" and the term *allemannsratt* means "every man's right." Each of the terms essentially "grants anyone the right within certain restrictions to move freely across private and public land holdings as long as current land use is not hindered" (Raadik et al., 2010, p. 235). This Northern European view contrasts with the North American view where access to nature is controlled and regulated by public and private ownership (Hendee, Stankey, & Lucas, 1990; Raadik et al., 2010).

Moving away from Europe, it is worth looking at Eastern cultures since they are generally perceived as quite distinct from North American cultures. As mentioned by Markus and Kitayama (1991), people from Asia are more likely to hold interdependent self-construal. In Chinese culture, being attentive and sensitive to others who are in close proximity to oneself is considered to be a virtuous attitude which is also one of the teachings from Confucian principles (Gabrenya & Hwang, 1996; Walker et al., 2001). As Gabrenya and Hwang (1996) wrote, "[The] Chinese expect people to anticipate others' needs or to know their feelings without asking or being told; to do otherwise indicates poor social skills or a characterological deficit" (p. 315). Based on this cultural characteristic, Walker et al. (2001) examined the self-construal and motivation of outdoor recreationists of both Chinese ethnicity and Euro-North American ethnicity to visit Canadian national parks. The results show that Chinese people cared less about nature/tranquility and autonomy/independence motivations but more about group membership and humble/modest motivations than Euro-North Americans.

Shinrin-yoku is a Japanese term for forest bathing, which shares the same etymology with the Korean term *san-lim-yok*. *Shinrin-yoku* can be defined as "a traditional Japanese practice of immersing oneself in nature by mindfully using all five senses" (Hansen et al., p. 1), such as enjoying a scenic view, the smell of wood, the sound of leaves rustling, and feeling/touching trees and rocks (Tsunetsugu et al., 2010). So far, the research on *shinrin-yoku*, or forest bathing, in East Asia has been mostly focused on its therapeutic benefits (Han et al., 2016; Hansen et al., 2017; Morita et al., 2007; Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2010; Tsunetsugu et al., 2010). Similarly, the definition of the Chinese term *shengtai luyou*, which is close in meaning to the Western concept of ecotourism, specifically considers the health benefits that arise from being in nature (Buckley, Cater, Linsheng, & Chen, 2008). Asian cultures appear to consider the health benefits of nature-based activities particularly important. These distinct cultural perspectives on nature and nature-based recreation may influence individuals' engagement in mounting hiking, in part through effects on their hiking motivations, the hiking constraints they may perceive or experience, and the negotiating strategies they work to overcome constraints.

RESEARCH MODEL AND HYPOTHESIS

Based on the rationales discussed in the Introduction and the research gaps mentioned in the Literature Review, the purpose of this study is twofold. The first purpose is to examine the relationships among the leisure constraints, negotiation, motivation, and participation of mountain hikers through Hubbard and Mannell's (2010) constraint-effects-mitigation model. The second purpose is to test cultural differences between Canadians and South Koreans for their leisure constraints-negotiation, specifically in mountain hiking.

The research questions of this study are as follows:

1. Is the constraint-effect-mitigation model, which includes leisure constraints, negotiations, and leisure motivations, suitable for predicting mountain hiking participation?
2. How do leisure constraints and motivations influence negotiation strategies and participation in mountain hiking?
3. How does negotiation mediate relations among constraints, motivation, and participation in mountain hiking?
4. What are the differences and similarities between Canadian and South Korean mountain hikers?

Hypothesis:

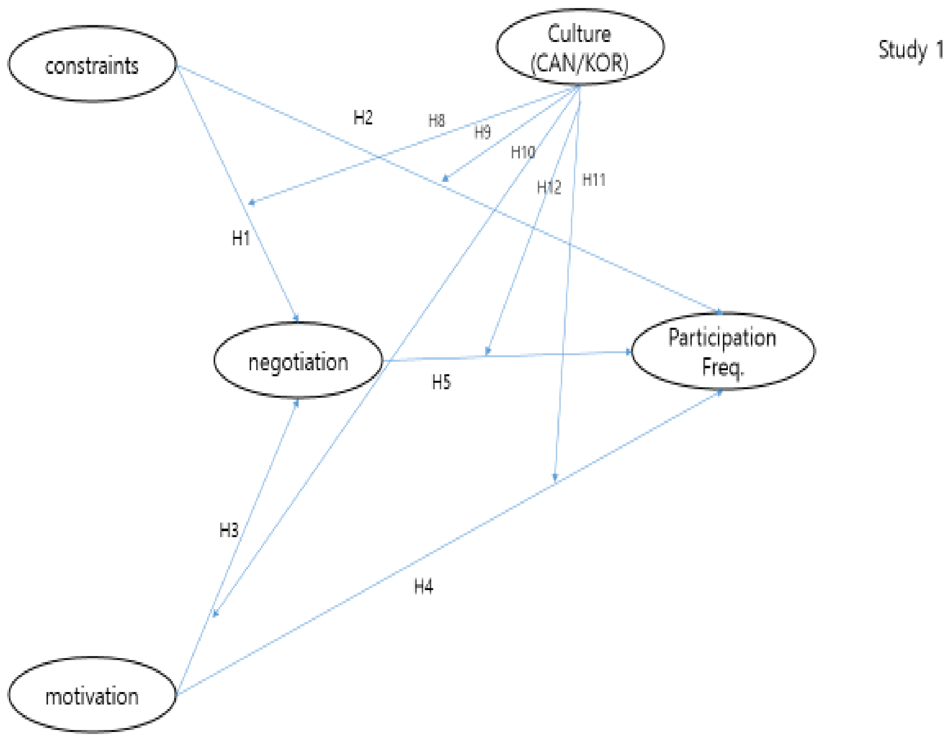


Figure 2.2. Research hypotheses

H1: Constraints will positively influence negotiation.

H2: Constraints will negatively influence frequency of participation.

H3: Motivation will positively influence negotiation.

H4: Motivation will positively influence frequency of participation.

H5: Negotiation will positively influence frequency of participation.

H6: Negotiation will mediate the relationship between constraints and frequency of participation.

H7: Negotiation will mediate the relationship between motivation and frequency of participation.

H8: Culture will moderate the influence of constraints on negotiation.

H9: Culture will moderate the influence of constraints on frequency of participation.

H10: Culture will moderate the influence of motivation on negotiation.

H11: Culture will moderate the influence of motivation on frequency of participation.

H12: Culture will moderate the influence of negotiation on frequency of participation.

METHOD

Participants

The target populations were Canadian and South Korean adults participating in outdoor recreation, namely mountain hiking. Non-English speakers were excluded from participation in the Canada survey, and non-Korean speakers were excluded from participation in the South Korea survey. The participants were able to refuse to answer any question and withdraw at any time before handing in the questionnaire to the surveyor. The participants were not allowed to withdraw their data after handing the questionnaire back to the surveyor. A small refreshment such as chocolates, caramels, or lemonades were given to the participants who completed the survey as a token of appreciation.

Efforts were made to obtain as heterogeneous sample as possible of hikers. We sampled at locations where both day and overnight hikers frequented, and a variety of hiking trails – from 1 hour easy to 8 hours+ challenging hikes were possible. We were interested in sampling hikers with a high degree of hiking experience, frequently engage in hiking and who found it easy to negotiate barriers to engage in hiking, as well as those who might be characterized by low frequencies of hiking or hiking experience and may experience more constraints

1. Canada survey process

Hikers and trail users visiting Canada's Rocky Mountain parks (i.e., Jasper and Banff National Parks, as well as Alberta Parks' Kananaskis Country protected areas) were targeted. The sampling method was non-probability and convenience sampling. Web-based survey program Qualtrics (www.qualtrics.com) was used both for offline and online surveying. All the surveys took place at public locations (e.g., trail heads, parking lots, scenic lookouts, visitor centers) using tablet PCs with an offline version of the Qualtrics questionnaire. Those participants who were not willing to participate on-site but were willing to participate afterwards were given an online survey link that they could access upon their return home to complete the survey. The option of a paper-based questionnaire with a postage-paid envelope provided, was also available. In order to diversify the sample, data was collected on weekdays and weekends. All surveys were collected between August 1 and Oct. 15, 2019. The surveyors intercepted visitors in both back-country (e.g., semi-wilderness trails and scenic lookouts) and front country (e.g., trail heads and parking lots) contexts in order to obtain information from hikers who ranged from novice to experienced, as well as hikers who made short trips (<2 hours) and long trips (up to 8 hours and overnight). While all the people who were encountered by the surveyors in the mid- and back-country hiking trails were asked to participate, every fifth person that the surveyors encountered in the front-country was asked to participate.

2. South Korea survey process

Hikers and trail users visiting Seorak and Bukhan National Parks were targeted. The sampling method was also non-probability and convenience sampling for the South Korea survey. Mixed methods of online and offline surveys were employed. That is, distributing the online survey with tablet PCs on offline sites. The Google Form service, which is a web-based survey program, was used for formulating the online questionnaire. The online link to the Google survey was distributed to those who agreed to participate after the hiking at their disposal. In order to screen participants who had no (or very little) hiking experience, a screening question asking whether they participated in hiking at least once a year was placed at the beginning of the questionnaire.

Participants were recruited at sites such as trail heads, trails, information centers, and parking lots of targeted national parks. Identical to the Canada survey, data was collected during both weekdays and weekends in order to stratify the sample. Also identically, every fifth person that surveyors encountered on the trail heads and the parking lots was asked to participate while all the people who were encountered by surveyors in the mid- and higher altitude locations among the hiking trails were asked to participate. Collection in Korea took place from July 1 to August 31, 2020.

Overall, a total of around 400 samples of data were targeted from the two countries. According to Hair, Hult, Ringle, and Sarstedt (2016), the rule of thumb criteria for the minimum sample size in the PLS-SEM model at a statistical power of 0.80, with five arrows pointing at constructs and 5% of significant level detecting a small effect size (R-squared = 0.10) was recommended as 147 samples. The R-squared value of previous research on leisure constraints-negotiation models ranged variably from a small to a medium-large effect size (Hubbard & Mannell, 2001; Schneider & Wynveen, 2015; Schroeder et al., 2012; Son et al., 2008; White, 2008; Wilhelm Stanis et al., 2009). Assuming that the model of this study needs a minimum sample size for detecting a small effect, this number makes it a safer choice than collecting fewer samples. Moreover, the model needed a minimum sample size from each group to test the moderation of cultures between Canada and South Korea. Thus, more than 300 samples were needed for the analysis.

Measurement

Hubbard and Mannell's (2001) constraints-effects-mitigation model was utilized to investigate constraints and negotiation in this study. The variables of the constraints-effects-mitigation model are constraints, motivation, negotiation, and participation. The constraints variable consists of three subfactors, which are intrapersonal, interpersonal, and structural (Crawford et al., 1991; Hubbard & Mannell, 2001; White, 2008). The three-factor constraints model, instead of Dong and Chick's (2012) eight-factor model or others, was used in this study for its parsimony, tradition, and proven performance in Western populations research. The negotiation variable consists of six subfactors and their measurement items collectively from a number of previous studies, which are changing leisure aspirations, improving finance, changing interpersonal relations, energy management, skills acquisition, and time management (Hubbard & Mannell, 2001; Loucks-Atkinson & Mannell, 2007; White, 2008). For the measurement of motivation in this study, the Recreation Experience Preference (REP) was used instead of Hubbard and Mannell's (2001) two-item global measurement (Manfredo et al., 1996; Moore & Driver, 2005; White, 2008). Manfredo et al. (1996) suggested that using the REP scale to measure the motivation to participate in an outdoor recreation setting would bring relevance to specific studies. From the full REP scales that consist of 19 factors, only five constructs (achievement, enjoy nature, escape, socialize, and health) that are closely relevant to this study were considered, inspired by previous outdoor recreation studies (Kim et al., 2015; Walker et al., 2001; White, 2008; Wilhelm Stanis et al., 2009). The leisure participation was measured by a combination of the frequency of participation in hiking (number of visits) and the duration of the planned hike (time required to complete the hiking course).

In total, 15 items were assembled to measure the participants' leisure constraints (six intrapersonal, three interpersonal, and six structural). Twenty-two items were developed to measure negotiation (four changing leisure aspirations, two improving finances, seven changing interpersonal relations, two energy management, four skill acquisition/information, and three time management). Sixteen items were used to measure motivation to hike (four achievements, three enjoy nature, four escape, three socialize, and two health). Participation was measured by items concerning the annual frequency of hiking and the duration of the hiking course that was planned on the day of participation in the survey. The finalized questionnaire in English was translated into the Korean language for the survey in South Korea by using back-translation and parallel translation methods (Malhotra, Agarwal, & Peterson, 1996; McGorry, 2000). The items used are reported in Table 2.1.

Analysis

PLS-SEM (Partial Least Squares Structural Equation Modeling) was used to analyze the collected data. In recreation studies a CB-SEM approach has been more widely applied than PLS-SEM, but PLS-SEM should be considered more often for its distinguishing purpose and objectives. For instance, unlike CB-SEM, PLS-SEM can consider both reflective measurement and formative measurement models (Hair, Hult, Ringle, & Sarstedt, 2016). In reflective measurement models, the items are representations of their constructs and the causality is drawn from constructs toward the items. In formative measurement models, each item of the construct is a specific aspect of the construct; it has a distinct influence on the construct (Jun & Kyle, 2011; Kono, Ito, & Loucks-Atkinson, 2018). Items used to represent reflective measurement constructs are interchangeable and highly correlated, whereas items for formative measurement constructs are essential, uncorrelated, and supposedly have all the aspects that form the construct. These are theoretical concepts and their latent variables should be considered as formative rather than reflective but they have often been treated as reflective measurements by choosing CB-SEM as the analysis method (Kono et al., 2018; Kono, Ito, Walker, & Gui, 2020). Emerging leisure studies suggest that leisure constraints factors and items, and also potentially constraints-negotiation, could be more effectively treated as a formative structure for theoretical exploration (Kono et al., 2018; Kyle & Jun, 2015). In this study, leisure constraints' indicators were treated as a formative measurement model inspired by Jun and Kyle (2011) and Kono et al. (2018). Thus, employing PLS-SEM was necessary.

The SmartPLS 3 program was utilized to assess the measurement model and the structural model. Measurement modeling includes internal consistency reliability, convergent validity, discriminant validity, and collinearity issues for the reflective and the formative items. Structural modeling includes collinearity assessment through correlation and VIF value, path coefficients analysis, and the R-square value, and f-square value assessments.

Validity and reliability of measurements / Measurement model

The content validity of the questionnaire items used in this study was verified by two professors in the leisure studies field, and two others with Ph.D. in the sport and the leisure field. The constraints variable's factors were treated as a formative-formative type of hierarchical component modeling (HCM), which means that both its items and constructs are formatively structured. The formative measurements' validity was examined by using collinearity statistics (VIF) and the significance of outer weights and outer loadings.

The measurements were free of the multicollinearity issue as the variance inflation factor (VIF) values were all under the threshold of 5 (Hair et al., 2016). The outer weights of a few indicators of structural constraints and a couple of indicators from interpersonal and intrapersonal constraints were each non-significant. The non-significant outer weights were then assessed for their outer loadings. All the outer loadings were significant except for the structural constraints item "I don't have enough time for hiking" (p =.067). The statistical guideline suggests discarding a formative measure with non-significant outer loading. However, the same reference also suggests that as long as there is theoretical conceptualization support, a formative measurement should not be removed simply based on the statistical criterion (Hair et al., 2016). The item “I don’t have enough time for hiking” is the only item regarding time constraints among the structural constraints. The item was needed for analysis of constraints’ relationship to leisure negotiation’s time management. Furthermore, when the formative structural model was assessed, the item converged confirming its validity. Thus, it was decided that the indicator would be retained.

Negotiation and motivation factors were treated as the reflective-formative type of HCM, which means that the items are reflectively structured to the constructs and the constructs are formatively structured toward the latent variable. To test the validity and reliability of reflective items in PLS-SEM, Composite Reliability (CR) and Average Variance Extracted (AVE) values are calculated and compared to the acceptance criteria. It is considered to be valid when the CR value is 0.7 or higher and the AVE value is higher than 0.5. All the constructs yielded proper CR and AVE values (Table 2.1), thus the reliability and the convergent validity were supported. In the process, four items which did not converge with the criteria were removed. The discarded items were “I choose places to hike where I feel comfortable” (changing leisure aspiration), “I participate in hiking activities with people of the same gender” (changing interpersonal relations), “I organize hiking trips to encourage friends and family to participate in hiking” (changing interpersonal relations), “When selecting a hiking location, I choose routes that would interest potential hiking companions” (changing interpersonal relations).

The discriminant validity of the reflective measurements was verified by the heterotrait-monotrait ratio of correlation measure (HTMT). The HTMT is considered to be a better measure for assessing discriminant validity than typical methods such as the Fornell-Larcker criterion or cross-loading (Duarte & Amaro, 2018; Henseler, Ringle, & Sarstedt, 2015). Almost all the HTMT ratios among the measurements were under the conservative threshold of .85 (Duarte & Amaro, 2018; Kline, 2015). The ratios between the energy management measures and the changing leisure aspiration measures, and between the time management and the skill/information measures were still under .90 thresholds (Duarte & Amaro, 2018; Gold, Malhotra, & Segars, 2001; Teo, Srivastava, & Jiang, 2008). Thus, the discriminant validity of the reflective measurements stands.

Table 2.1. Mean/Standard deviation and Confirmatory factor analysis for the reflective measurements

	constructs	items	M	S.D.	CR	AVE
Leisure constraints	Intrapersonal	I am not interested in hiking.	1.73	.990	Formative indicators	
		I am afraid of getting hurt while hiking.	2.51	1.129		
		I am afraid of getting lost while hiking.	2.34	1.116		
		I cannot access enough information about hiking.	2.13	1.032		
		I lack of skills to go hiking.	2.32	1.068		
		I lack the physical ability to go hiking.	2.10	1.066		
	Interpersonal	My companions usually prefer activities other than hiking.	3.05	1.096		
		I don't have people to go hiking with.	2.36	1.186		
		The people I know live too far away to go hiking with me.	2.35	1.161		
	Structural	The fees to go hiking make it too expensive.	1.90	1.008		
		The equipment for hiking is too expensive.	2.75	1.228		
		I don't have the right equipment.	2.52	1.234		
		The place for hiking is too far away.	2.44	1.191		
		I lack transportation to hiking sites.	2.00	1.159		
		I don't have enough time for hiking.	2.80	1.177		

Participation		How long is your hike today? (duration)	2.20	.642	Single indicators	
		How often a year do you hike? (frequency)	2.17	.968		
Constraints negotiation	changing leisure aspiration	I choose hiking routes that are appropriate to my fitness level	3.73	.903	.786	.552
		I sometimes change my hiking location due to trail and weather conditions.	3.96	.841		
		I try to visit my favorite hiking place when it is less crowded.	3.86	.916		
	finance	I budget my money to enable more hiking.	3.72	1.041	.763	.619
		I choose locations to hike that are less expensive.	2.64	1.108		
	changing interpersonal relations	I participate in hiking activities with people whose age is similar to mine.	3.11	1.076	.745	.504
		I hike with people with similar interests.	3.38	1.143		
		I actively look for people to hike with.	2.86	1.060		
	energy management	I get a lot of rest to prepare for hiking.	3.75	.956	.757	.620
		When hiking, I try to set the right pace for my fitness level.	3.19	1.134		
	Skill acquisition/ information	I try to improve my hiking skills.	3.55	1.038	.842	.573
		I get advice from experienced hikers.	2.87	1.090		
		I seek out information about the best hiking trails.	3.10	1.039		

		I look for information on transport and access to hiking sites.	3.96	.809		
	time management	I set aside time for hiking.	3.51	1.046	.869	.689
		To ensure that I can hike, I try to plan ahead for things.	3.09	1.145		
		I get up early or stay up late to increase time for hiking.	3.62	1.129		
Motivation	achievement	I go hiking to gain a sense of accomplishment.	3.47	1.136	.881	.649
		I go hiking to experience excitement/adventure	3.35	1.114		
		I go hiking to gain a sense of self-confidence.	3.59	1.085		
		I go hiking to develop my skills and abilities.	3.16	1.159		
	enjoy nature	I go hiking to be close to nature.	3.79	1.026	.910	.772
		I go hiking to observe the scenic beauty.	3.59	1.176		
		I go hiking to enjoy the sounds and smells of nature.	3.50	1.044		
	escape	I go hiking to get away from the usual demands of life.	3.27	1.125	.892	.673
		I go hiking to experience solitude.	4.21	.883		
		I go hiking to experience peace and quiet.	4.35	.790		
		I go hiking to unwind.	4.27	.854		
	social	I go hiking to be with family or friends.	4.08	.950	.864	.679
		I go hiking to be with people who share my values.	3.46	1.175		

		I go hiking to feel connected to others.	3.97	1.073		
	health	I go hiking to improve my physical fitness	3.78	1.095	.903	.824
		I go hiking to improve my mental well-being.	3.82	1.091		

RESULTS

Descriptive statistics

A total of 198 Canadians participated in the survey, which took place in Canada. Six cases with missing values of more than 30% and five cases without demographic information were deleted from among the Canadian sample of 198. A total of 187 of the Canadians' responses were used for the analysis.

A total of 234 South Koreans agreed to participate in the survey in South Korea. Eighteen cases with missing values of more than 30% and four cases without demographic information were deleted. A total of 212 South Korean responses were used for the research analysis.

Cases with a missing values rate of under 30% were treated with EM algorithm imputation. EM algorithm is one of the missing value imputation methods that are based on ML (Maximum Likelihood) estimations. According to Kock (2014) and Kristensen and Eskildsen (2010), multiple regression imputation and EM algorithm imputation methods showed the least biased results in PLS-SEM analysis, outperforming other missing value imputation methods such as pairwise or mean substitution. Kristensen and Eskildsen (2010) suggested using EM algorithm imputation over regression imputation for PLS-SEM analysis purposes. The EM algorithm was executed separately by nation in order for the estimation to consider potential differences between the two groups. In the process of using the EM algorithm, the missing value analysis procedure yielded Little's MCAR test results that were not significant (p>0.05) for both of the groups, meaning that the missing data are either MCAR (Missing Completely at Random) or MAR (Missing at Random). MCAR indicates that missing values are ignorable because they are unpredictable. Missing values are still considered to be ignorable when the data are MAR (Allison, 2003; Tabachnick & Fidell, 2013).

Table 2.2 summarizes the overall descriptive analyses of the participants. Gender was almost equally distributed between male participants (50.1%) and female participants (49.4%) with very few who classified themselves as other sex or preferred not to answer (0.5%). The majority of the participants either held a bachelor's degree (37.6%) or a graduate degree (26.6%), while their education level was of high school graduate, college diploma/apprenticeship, and some university at 13%, 11%, and 9.5%, respectively. Participants with an education level of less than elementary school level were the least represented (2.3%). Participants responded to the question about the duration of the hiking course that they had completed on the day of the survey. Ten percent of the participants followed the course for 1 hour or less. The great majority engaged in 1 to 3 hours of hiking (62.4%), and the next largest group engaged in hiking for more than 3 hours on a day trip (25.1%). Hiking frequency was measured by days of participation in a year. The frequency was then grouped into four groups. The percentage of hikers who hiked once a season or less frequently was 30.1%. The percentage of hikers who hiked more than once a season to once a month was 32.9%. The percentage of hikers who hiked more than once a month to once a week was 27.4%. Only 9.8% hiked more than once a week. The mean age of the participants was 40.3 years old, and the perceived hiking experience level was an average of 58.8 out of 100. In addition, Table 2.3 summarizes the descriptive analysis result of the final dataset by country.

Distribution normality was also assessed with the skewness and kurtosis trends of the dataset. Although one of the PLS-SEM analysis's strengths is not making strict normal distribution assumptions due to its non-parametric nature, recent studies guiding PLS-SEM suggest that researchers should not overly depend on it (Henseler, Hubona, & Ray, 2016; Kono et al., 2020). The skewness and kurtosis statistics yielded near 0 or -1/+1 for the most part except for a couple of indicators shown as values within -3/+3, which indicates that the distribution of the dataset is close to normal.

Table 2.2. Frequency analysis of demographics (overall sample)

		n	%
Country	Canada	187	46.9
	South Korea	212	53.1
Gender	Male	200	50.1
	Female	197	49.4
	Other/Prefer not to answer	2	0.5
Education	Elementary school	9	2.3
	High school	52	13.0
	College diploma/ apprenticeship	44	11.0
	Some university	38	9.5
	University Bachelor's degree	150	37.6
	University Graduate's degree	106	26.6
Hiking duration	1 hour or less	40	10.0
	1 to 3 hours	249	62.4
	More than 3 hours day trip	100	25.1
	Overnight trip	10	2.5
Hiking frequency	Once a season and less	120	30.1
	More than once a season -Once a month	131	32.9
	Morea than once a month -Once a week	109	27.4
	More than once a week	39	9.8
Total n		399	

	Mean	SD
Age	40.3	16.2
Perceived level of hiking experience	58.8/100	22.0

Table 2.3. Frequency analysis of demographics (separate cultural groups)

		CAN (n=187)	%	KOR (n=212)	%
Gender	Male	82	43.9	118	55.7
	Female	103	55.1	94	44.3
	Other/Prefer not to answer	2	1.1	0	0
Education	Elementary school	3	1.6	6	2.8
	High school	15	8.0	37	17.5
	College diploma/apprenticeship	20	17.7	24	11.3
	Some university	8	4.3	30	14.2
	University Bachelor's degree	76	40.6	74	34.9
	University Graduate's degree	65	34.8	41	19.3
Hiking duration	1 hour or less	22	11.8	18	8.5
	1 to 3 hours	114	61.0	135	63.7
	More than 3 hours day trip	42	22.5	58	27.4
	Overnight trip	9	4.8	1	0.5
Hiking frequency	Once a season and less	49	26.2	71	33.5
	More than once a season - Once a month	76	40.6	55	26.0
	Morea than once a month - Once a week	50	26.7	59	27.9
	More than once a week	12	6.4	27	12.7
Total n		187		212	

	Mean	SD	Mean	SD
Age	35.1	14.2	45	16.4
Perceived experience level at hiking	60.6/100	22.1	57.2/100	21.8

Structural model specification

In specifying HCM (hierarchical component modeling), this study utilized the two-stage approach. Of the two general approaches for HCM specification with formative indicators, which are the repeated indicators approach and the two-stage approach, this study chose the latter because of its advantage in forming path relationships among higher-order constructs and comparing the path effects between multi-group (Becker, Klein, & Wetzels, 2012; Hair, Sarstedt, Ringle, & Gudergan, 2017; Sarstedt, Hair, Cheah, Becker, & Ringle, 2019). The conceptual image of the first stage can be represented as Figure 2.3. The indicators of the constraints variable are formatively constructed towards lower-order constructs: intrapersonal, interpersonal, and structural (Kono et al., 2018; Kyle & Jun, 2015). The indicators of the other variables, motivation and negotiation, are reflectively formulated from lower-order constructs of those variables.

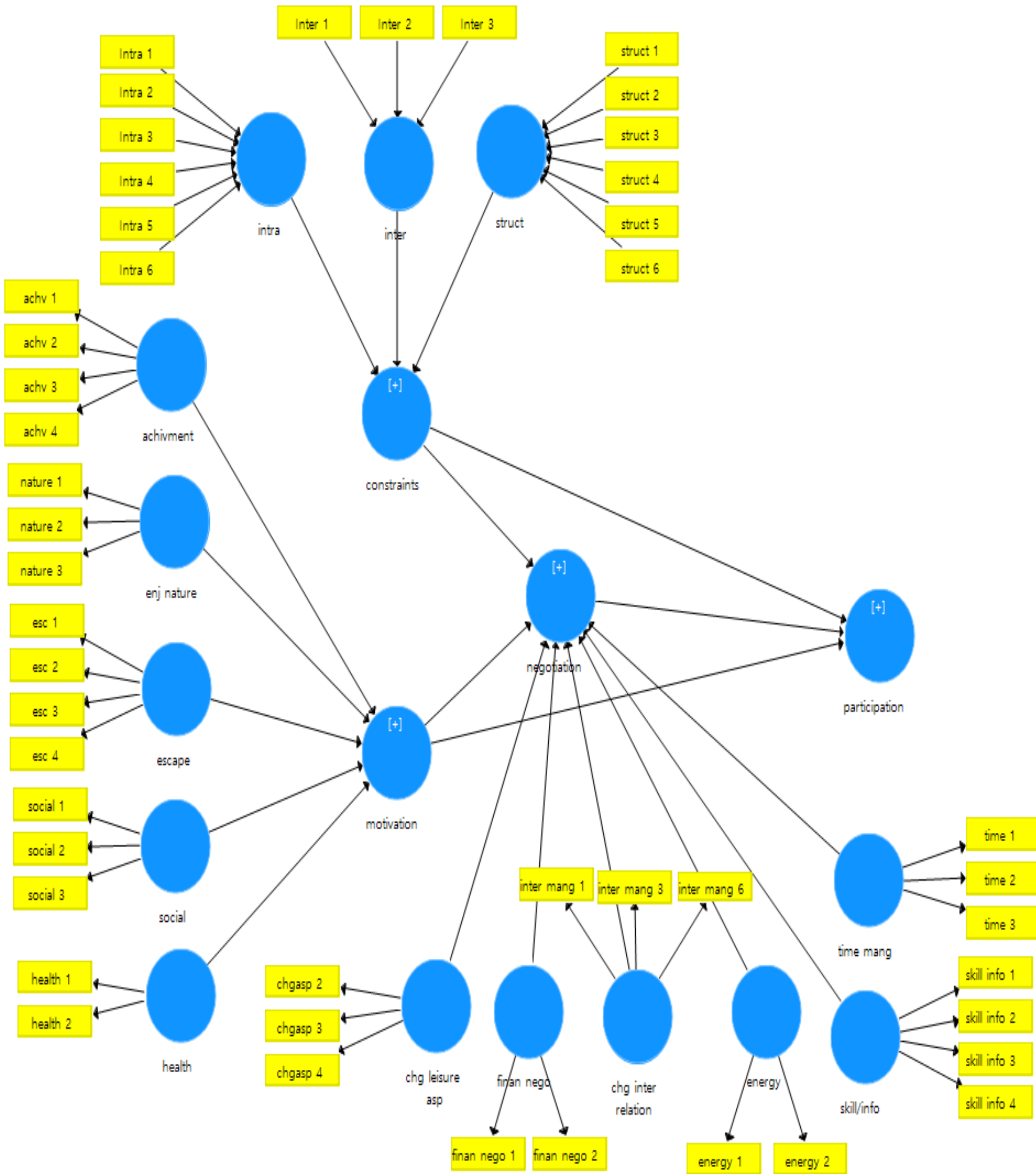


Figure 2.3. First stage of the two-stage approach HCM

All the lower-order constructs are formatively related to their designated higher-order latent variables. This formative model specification between higher-order and lower-order constructs of leisure constraints and negotiation theory is novel. However, there are two valid reasons why this study's HCM modeling for constraints-negotiation is worth exploring.

First, the theoretical and conceptual foundation of formative modeling supports the specification. Decision rules for determining formative constructs suggest that 1) the direction of causality should be outward from indicators to the construct, meaning that items are defining constructs; 2) indicators are not interchangeable meaning that dropping one item may jeopardize the domain of the construct; 3) covariation among the indicators is not necessary; and 4) it is not necessary for indicators to have the same antecedents and consequences (Hair et al., 2017; Jarvis, MacKenzie, & Podsakoff, 2003). The sub-constructs of leisure constraints, leisure negotiation, and motivation (REP scale) are in alignment with the four rules of formative specification, which means they directly contradict the rules for being reflective constructs.

Second, if the negotiation and the motivation constructs were to be formulated with their sub-constructs reflectively as CB-SEM researches have been, then the HCM specification in this study would be the reflective-reflective type. However, reflective-reflective HCM specification in PLS-SEM has been criticized by some researchers for its flawed logic. Reflective measurements are supposed to be unidimensional and interchangeable in nature. This logic conflicts with the multiple underlying sub-dimensions designed to be distinct from each other in formulating the higher-order latent variable (Becker et al., 2012; Hair et al., 2017; Lee & Cadogan, 2013). Lee and Cadogan (2013) mentioned that reflective-reflective HCM may produce results that are misleading or even meaningless and should be approached with caution (Becker et al., 2012).

From the first stage of the two-stage approach (Figure 2.3), path scores among the lower-order constructs were saved and added to the dataset as indicators (disjoint two-stage approach). These path scores from the first stage then became formative measurements for the higher-order latent variables in the second stage. Figure 2.4 indicates the second stage of the two-stage approach HCM specification of this study. Figure 2.5 represents the path results.

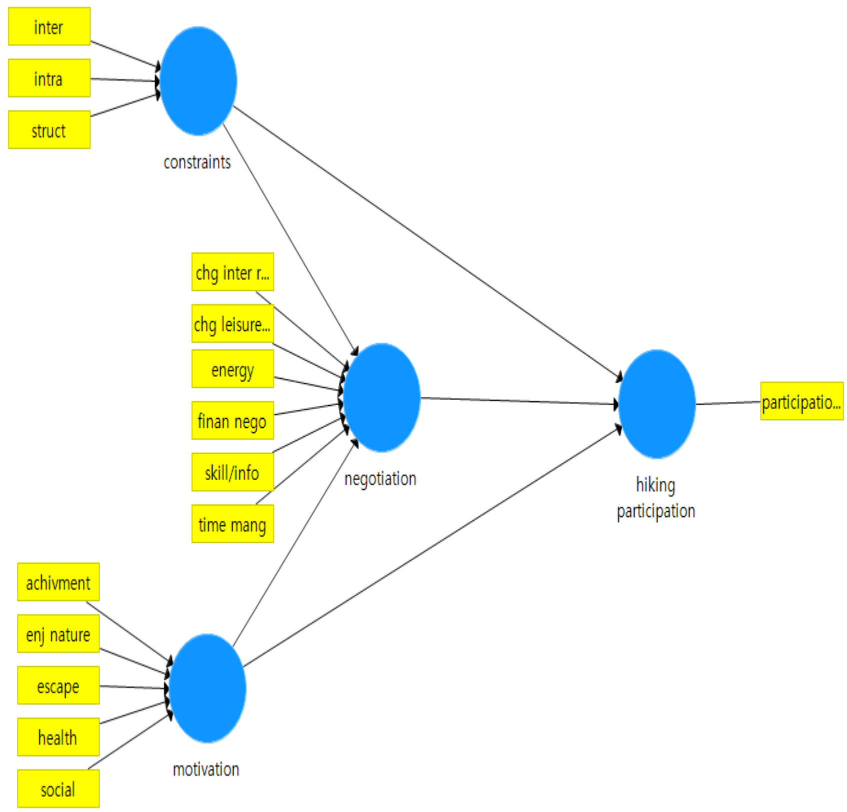


Figure 2.4. Second stage of the two-stage approach HCM

Structural model validation and the results

The final HCM model of the two-stage approach was assessed for its model validation. Since all the constructs of the second stage HCM specification are formative, assessment methods for formative specification were applied. First, the structural model's collinearity was assessed through examination of the VIF (Variance Inflation Factor) of the lower-order measurements. All the VIF were below 5.0 and even lower than 3.0, which is more rigorous criterion (Hair et al., 2017). R-square values and f-square values were also examined. The R-square value represents the explanation power and the f-square value represents the effect size. The R-square value of the paths toward the negotiation variable was .55, which is more than moderate. The R-square value of the paths toward the participation variable was .10, which is relatively lower than the usual expectation. This may have been caused by fairly homogeneous respondents who have already succeeded in visiting mountain parks to hike. The f-square values of the paths are shown to have a small to large effect size except for the path between the negotiation and the participation. The path between the negotiation and the participation yielded an f-square value of 0.014, which is less than the established threshold value of .02 which indicates small effect size (Cohen, 1988; Hair et al., 2017). The VIF, R-square, and f-square values were estimated from the PLS algorithm procedure.

Second, the significance of outer weights and outer loadings was examined from bootstrapping analysis. The outer weights' significance level was first assessed to see the indicators' relative contribution to their constructs. One indicator from the constraints, three indicators from the negotiation, and three indicators from the motivation variables were non-significant. The indicators with non-significant outer weights should be examined with their outer loading as the next step to decide whether or not they should be retained in the formative model (Hair et al., 2016). All the outer loadings of the indicators came out significant at a p-value smaller than .05. Thus, all the formative low-order indicators and the HCM specification are valid.

The bootstrapping procedure was computed with 5,000 subsamples with the bias-corrected and accelerated (BCa) option. The final results of the path coefficients and the total effects with their significance level are indicated in Table 2.4.

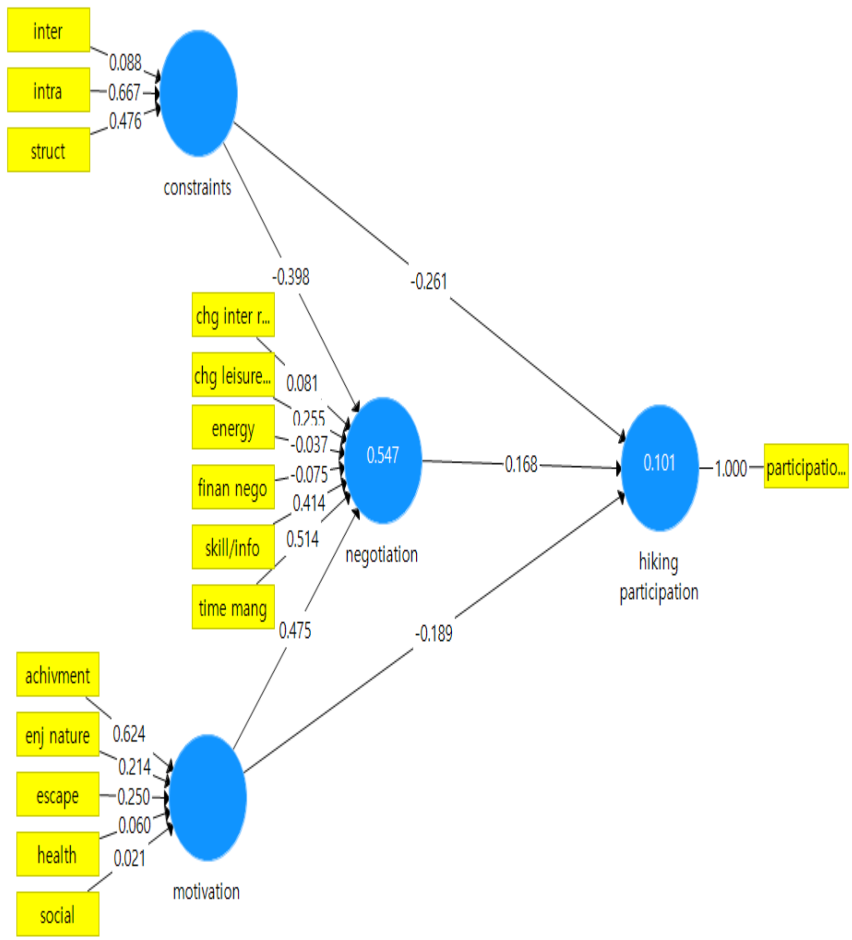


Figure 2.5. PLS-SEM model path analysis results

Table 2.4. The path analysis and bootstrapping results (overall sample)

	Path coefficient	ß	t	Sig.	f^2
H1	constraints -> negotiation	-.398	8.331	.000	.284
H2	constraints -> hiking	-.261	4.416	.000	.048
H3	motivation -> negotiation	.475	9.273	.000	.406
H4	motivation -> hiking	-.189	2.630	.009	.023
H5	negotiation -> hiking	.168	2.211	.027	.014
	Specific indirect effect	ß	t	Sig.	VAF
H6	constraints -> negotiation -> hiking	-.067	2.117	.034	.204 (partial)
H7	motivation -> negotiation -> hiking	.080	2.029	.042	.734 (partial)

The path between the constraints and the negotiation was negatively significant (ß = -.398, $p < .001$), which did not support H1 but was statistically significant in the inverse direction. The path from the constraints to the participation was negatively significant (ß = -.261, $p<.001$), which statistically supports H2. The path between the motivation and the negotiation was positively significant (ß =. 475, $p<.001$), which statistically supports H3. The path from the motivation toward the participation was negatively significant (ß = -.189, $p = .009$), which did not support H4 but was statistically significant in inversed direction. The path between the negotiation and the participation was positively significant (ß = .168, $p = .027$), which statistically supports H5.

The results of the specific indirect effect indicate the negotiation variable's mediating effect in the model. Negotiation significantly mediated the path between the constraints and the participation (ß = -.067, p = .034) but it added the indirect negative effect of the constraints on participation when it was supposed to positively mediate the negative effect as H6 was hypothesized. On the other hand, the negotiation successfully mediated the path between the motivation and the participation in a positive direction as H7 was hypothesized (ß = .08, p = .042). The unexpected negative path direction between the motivation and the participation was non-significant in total effect due to the negotiation's counter effect.

Multi-group analysis (PLS-MGA)

The structural model estimation comparison between Canadian and South Korean samples was also part of the research objectives. This comparison was done by the PLS-MGA procedure of the SmartPLS 3. In order to properly execute PLS-MGA, the MICOM (measurement invariance of composite models) procedure is a prerequisite for confirming whether the measurements are statistically comparable between the two groups. This study's measurement model, however, did not converge with the MICOM procedure's requirements. In particular, the measurements of the negotiation variable's permutation p-value in MICOM "step 2" were smaller than .05 (p = .017), meaning that the measurement's compositional invariance cannot be supported. The PLS-SEM guidelines suggest that researchers should not perform PLS-MGA to compare groups when partial measurement invariance (MICOM step 2) fail to converge at the least. Thus, the hypotheses H8 through H12 cannot be statistically tested, although a researcher is still allowed to report the path model results separately for the two groups (Hair et al., 2017; Kono et al., 2020). Table 2.5 represents the path model's final results for each national group.

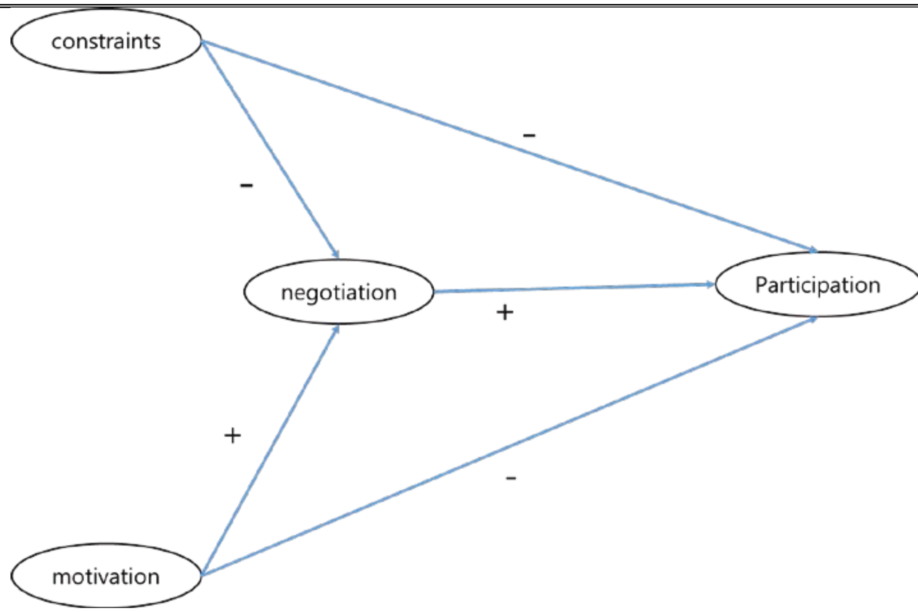
Table 2.5. The path analysis and bootstrapping results (separate cultural groups)

Canadian sample	ß	t	Sig.	f^2
constraints -> negotiation	-.380	3.821	.000	.246
constraints -> hiking	-.111	1.405	.160	.010
motivation -> negotiation	.466	4.467	.000	.370
motivation -> hiking	-.052	.514	.607	.002
negotiation -> hiking	.239	2.035	.042	.034
South Korean sample	ß	t	Sig.	f^2
constraints -> negotiation	-.357	5.909	.000	.227
constraints -> hiking	-.409	5.718	.000	.164
motivation -> negotiation	.505	7.891	.000	.454
motivation -> hiking	-.024	.237	.813	.000
negotiation -> hiking	.111	1.151	.250	.008

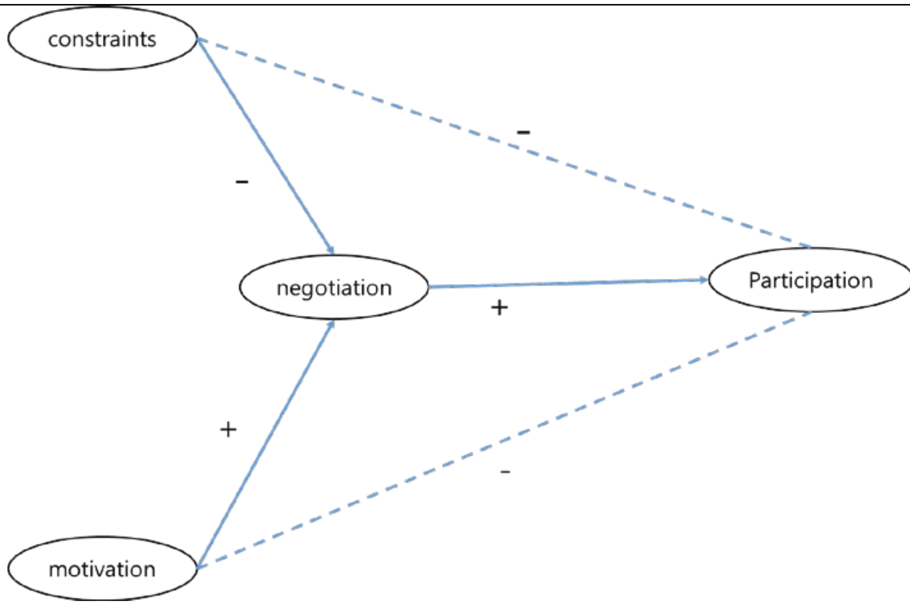
The non-significant path coefficient between the constraints and the motivation was shown only in the Canadian samples. These results also differ from the path analysis of the overall sample in Table 2.4. Negotiation's effect on participation was non-significant only for the South Korean sample, which is also different from the overall path analysis in Table 2.4. The images of the path coefficients and their significance for the overall sample and separate countries are presented in Table 2.6.

Table 2.6. The paths significance image for overall and cultural separation

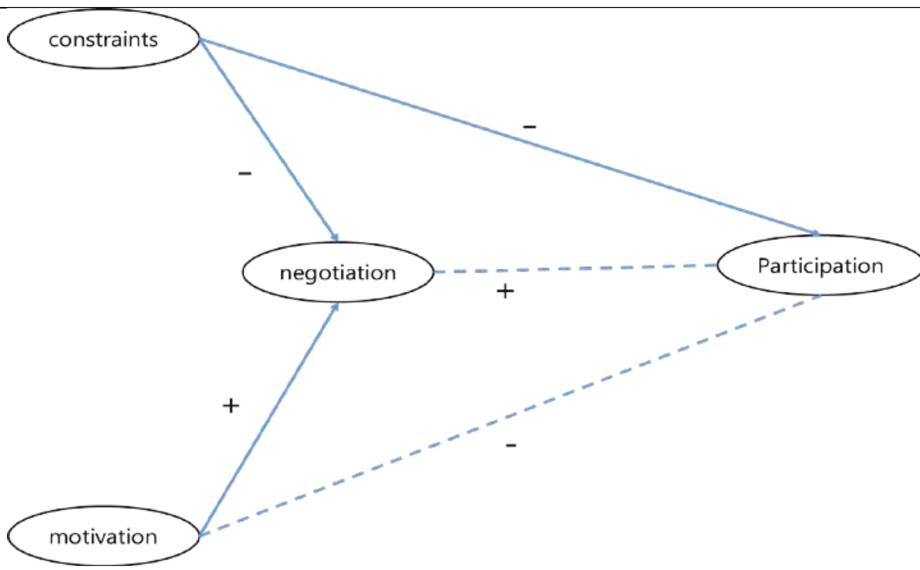
The path significance of overall sample



The path significance of Canadian sample



The path significance of S. Korean sample



DISCUSSION AND CONCLUSION

The purpose of this study was twofold. The first research objective was to examine the relationships among leisure constraints, leisure constraints negotiation, hiking motivation, and hiking participation, particularly through Hubbard and Mannell's (2010) constraints-effect-mitigation model. The second was to explore any cultural differences or similarities between Canadian and South Korean hikers, regarding hiking constraints-negotiation behavior in the mountain hiking contexts. The result suggested partial support for the constraints-effect-mitigation model, as two model paths showed opposite results from what was theorized. The results also suggest that the leisure constraints-negotiation behaviors between Canadian hikers and South Korean hikers appear to have different characteristics, although they were not statistically comparable.

Theoretical implications

The hypothesized structural model of this study was based on Hubbard and Mannell's (2010) constraints-effect-mitigation model but the results showed inconsistent relationships. The model only partially supported the mitigation model by confirming the negative path from the constraints to the participation, the positive path from the motivation to the negotiation, and the positive path from the negotiation to the participation. These confirmed paths in this study fully support Son et al.'s (2008) dual-channel model where they omitted the non-significant paths.

Kono et al. (2020) also found full support for the path relationships of the dual-channel model. They analyzed and compared the five constraints-negotiation models, the independence, the constraints-effects-mitigation, the perceived-constraints-reduction, the negotiation-buffer, and the dual-channel to study Japanese and Euro-Canadians' LTPA. While all the other models were only partially consistent with the hypothesized paths of different groups, the dual-channel model was fully supported in both groups. Similar results from Son et al. (2009) have also shown support for the dual-channel model. Although their structural model was extended with other variables, the hypothesized paths among constraints, negotiation, motivation, and participation yielded consistent results.

The negative path between constraints and participation and positive path between motivation and negotiation in particular have been confirmed the most frequently across the constraints-negotiation model assessments (Chen & Peng, 2016; Hung & Petrick, 2012; Kono et al., 2020; Lyu & Lee, 2016; Lyu & Oh, 2014; Son et al., 2009; White, 2008). Even in the case of Kono et al.'s (2020) study mentioned above, the models that were not supported, other than the dual-channel model, still yielded significant results for the two paths in both national samples. Although there are some exceptions (Kono et al., 2020; White, 2008), the relationship between negotiation and participation is also usually consistently positive throughout the previous researches (Chung, Baik, & Lee, 2017; Hung & Petrick, 2012; Schroeder et al., 2012; Son et al., 2009; Wilhelm Stanis et al., 2009). This study successfully added empirical evidence regarding leisure constraints' deteriorating impact on leisure participation and leisure motivation's facilitating role in leisure negotiation strategies in the hiking participation context. It is worth noting that the large effect size of the path between motivation and negotiation was the largest among the model's relationships. Additionally, an impact of leisure negotiation on leisure participation was also found, although further discussion is needed since its effect size was insufficient and inconsistent effects between cultures may be at play.

The results of this study that showed inconsistency with the hypothesized constraints-effects-mitigation model were the path between constraints and negotiation and the path from motivation to participation. The paths yielded reversed effects – that is to say, positively hypothesized but negatively related. Nevertheless, the significant negative path between constraints and negotiation is not uncommon in previous research.

A handful of previous studies reported the relationship between leisure constraints and leisure negotiation as either non-significant (Kono et al., 2020; Li, 2020; Ma & Ma, 2014; Son et al., 2008; Wilhelm Stanis et al., 2009) or negatively related (Boo, Carruthers, & Busser, 2014; Jun & Kyle, 2011; Lyu & Oh, 2014; Lyu, Oh, & Lee, 2013; Powers, Trauntvein, Barcelona, & Hartman, 2019). The studies that found a negative relationship reported strong intrapersonal constraints' negative impact on the behavioral negotiation among festival participants (Boo et al., 2014), self-efficacy's (aligning with the intrapersonal constraints) negative effect on the time/financial management in the recreational sport center use context (Powers et al., 2019), and intrapersonal and interpersonal constraints' negative impact on the cognitive negotiation among anglers (Lyu & Oh, 2014). Lyu et al. (2013) suggested that the negative relationship may have been caused by the participants being older and with disabilities, similar to Son et al. (2008). Overall, the negative relationship between constraints and negotiation may be mainly affiliated with intrapersonal constraints. In fact, the outer loading of the intrapersonal construct was larger than the other two constraints factors in this study, meaning that the intrapersonal factor is contributing the most to the negative effect from the constraints towards the negotiation. This outcome suggests that the strong intrapersonal constraints prevent hikers not only from hiking participation but also from having the will to put effort into negotiation strategies.

The large negative impact from constraints to negotiation is also evident in the mediation in this study. The indirect effect from constraints through negotiation towards participation supported the partial mediation effect but in a negative way. This outcome may also indicate that the strong negative effect of constraints overwhelms the positive effect of negotiation on participation in total.

The negative relationship between motivation and leisure participation, however, was an unexpected outcome. This negative relationship has not been found among the constraints-negotiation model studies so far, with one exception. Although not a structural model analysis, one a tourism study identified a negative impact of push/pull motivation on trip frequency and travel distance in the context of an overnight school excursion (Dale & Ritchie, 2020). The inconsistency of the motivation's impact in the theory may be explained by the fact that different studies have used similar but not the same measures for the construct (Dale & Ritchie, 2020; White, 2008; Wilhelm Stanis et al., 2009). In this current study, the REP scale (Driver et al., 1991) was used to measure the motivation construct, which is seldom done in the constraints-negotiation theory or in the outdoor recreation context (White, 2008; Wilhelm Stanis et al., 2009).

While the use of different measurements for the motivation may be a starting point to look for clues to the explanation for this negative path relationship, the mediation effect from motivation through negotiation towards participation in this study's analysis may reveal additional insights. The mediation effect was determined to be a partial mediation but its VAF (73%) was close to 80%, which is the threshold for the full mediation. An indirect mediation effect that is close to a full mediation forces down the direct path's relative contribution to the model, despite the path's significance level. In fact, the path's total effect (direct + indirect) yielded a non-significant result. This logic aligns with Jackson et al.'s (1993) balance proposition, the constraints-effect-mitigation model (Hubbard & Mannell, 2001), and the dual-channel model (Son et al., 2008), in that negotiation should work predominantly as a connector between the motivation and the participation.

The multi-group analysis between Canadian hikers and South Korean hikers also supported the claim that the aforementioned negative direct effect from motivation to participation should not be treated as noteworthy. The separate structural model analyses yielded non-significant paths between motivation and participation in both cultural groups with nearly zero effect sizes. On the other hand, the positive path between motivation and negotiation was significant and strong for both cultural groups. These similarities between the characteristics of the pathways from motivation to negotiation and participation indicate that hiking motivations are more likely to be related to negotiation than directly related to leisure participation. The overall and sub-group path relationship between motivation and participation, along with the mediating effect of negotiation, in this study contributes to the call for further exploration of this relationship (Chung et al., 2017).

Although not statistically supported, different characteristics of pathway relationships were detected. While the negative path between constraints and participation was significant among South Korean hikers, the path was non-significant among Canadian hikers. This may be explained in combination with the significance level differences of the path between negotiation and participation. The negotiation strategies had a significant impact on participation among the Canadians, whereas the relationship was weak among the South Koreans. It appears that South Korean hikers find it difficult to alleviate the various barriers while the Canadian hikers successfully employ negotiation strategies for their hiking activity.

The disconnection of the path from negotiation to leisure activity participation among an East-Asian cultural group (i.e., Japanese) compared to Euro-Canadians was also apparent in Kono et al.'s (2020) study. They found that the path between negotiation and participation was only significant with the Euro-Canadian sample, whereas the path among the Japanese sample was non-significant. Researchers such as Guo and Schneider (2015) and Ito et al. (2018) have suggested that the leisure constraints negotiation could differ across different cultures, especially between Eastern and Western cultures. One possibility for the contradicting outcomes could be that the concept of the constraints negotiation is more likely to be suited to the Western cultural group's recreational use of nature (Ito et al., 2018). In the particular case of this study, the outer loading of the changing interpersonal relations factor among the South Koreans was weak for negotiation compared to that of the Canadians. The weak loading value of interpersonal constraints among the South Koreans also supports the explanation. It appears that South Korean hikers are less likely to employ negotiation strategies related to hiking companions because they feel no need to do so. This may be because of the popularity of hiking in South Korea -- South Korean hikers may have a higher probability of finding others to hike with since one in three South Koreans are regular hikers (Gallup Korea, 2015; Harlan, 2014).

Another possibility that might explain the path differences is that constraints are much greater for leisure participation among South Korean hikers compared to the Canadian hikers in this study. The direct effect of constraints on hiking participation among the South Koreans was large and significant whereas it was less than small in terms of effect size and insignificant for the Canadians. The interpretation here could be that the South Koreans let strong barriers in their life interfere with their hiking activity and fail to circumvent them, whereas Canadian hikers succeed in doing so. This could be explained with self-construal theory (Markus & Kitayama, 1991). As one of the standard Asian cultures, South Korean culture is more likely to be represented by interdependent self-construal where people are more sensitive towards others' needs than self-interest or autonomy. On the other hand, people from Euro-Western cultures like Canada are more likely to hold independent self-construal meaning that they are more likely to be motivated by self-interest and preserving or asserting their own autonomy than being concerned with others' needs or belonging to a group (Gabrenya & Hwang, 1996; Walker et al., 2001; Walker et al., 2007). It is possible that South Korean hikers are more constrained because they are less likely to prioritize their leisure participation before everyday life demands and responsibilities such as work and family, or to make compromises for others' needs. Recent empirical studies by Ito et al. (2018) and Kono et al. (2020) found some similarities and differences between Japanese and Canadian regarding leisure constraints and constraints negotiation aspects. Ito et al. (2018) asserted that some of the differences between the two cultures may be caused by difference in self-construal between the two countries (Kitayama et al., 2007).

Limitations

There are some limitations of this study that need to be discussed. First, the three leisure constraints factors (intrapersonal, interpersonal, and structural) were formatively structured both at the indicators level and the constructs level (formative-formative HCM). The sub-constructs of the negotiation and the motivation variables in the model were also formatively specified towards the latent variables (reflective-formative HCM). Although the formative specifications in the model were theoretically supported (Hair et al., 2016; Hair et al., 2017), the statistical validation through the redundancy test was not feasible in this study because of a counter reflective or global item was not measured (Hair et al., 2016; Kono et al., 2018). According to Hair et al. (2016), formative measurements should represent all the possible aspects of a related construct. The formative measurements in this study may not represent all the possible aspects of the constructs, which needed to be tested. It is therefore suggested that future research should focus on the further assessment of the leisure constraints-negotiation's formative HCM.

Second, Hubbard and Mannell's (2001) constraints-effects-mitigation model was used to hypothesize the constraints-negotiation theory in this study but the model failed to be fully supported. It is true that the constraints-effects-mitigation model is the most often cited constraints-negotiation model among the five competitor models that Hubbard and Mannell (2001) and Son et al. (2008) introduced; however, it is also the case that the model has been rarely been fully supported by subsequent studies, and usually only partially supported. The model's inconsistency throughout the previous studies is well known (Chung et al., 2017; Hung & Petrick, 2012; Jun & Kyle, 2011; Kono et al., 2020; Lyu et al., 2013; White, 2008; Wilhelm Stanis et al., 2009). For instance, this study's result yielded the negative direction path between the constraints and the negotiation, which hints that the perceived-constraint-reduction model (Hubbard and Mannell, 2001) may be a better fit for this study. Further research is needed to compare the different constraints-negotiation models, along with new specifications and PLS models, in an attempt to find a model that explains and predicts leisure constraints and negotiation theory best. Methods such as the PLS prediction model comparison are recommended (Godbey et al., 2010; Kono et al., 2020). For instance, while Kono et al.'s (2020) model comparison using PLS predict analysis for leisure constraints-negotiation modeling gives a valuable addition to the related literatures, it is only an initial step in need of verification. Predictive modeling is different from but complementary to explanatory modeling (Kono et al., 2020; Shmueli, Ray, Estrada, & Chatla, 2016). Leisure constraints negotiation, and in fact most of the leisure behavioral theories, have mainly been explored using explanatory analytics. Leisure researchers also need to accumulate predictive analytics studies in order to find more generalizable leisure theories.

Lastly, the use of PLS-SEM analysis and treating leisure constraints and constraints-negotiation factors as formative is still debated. There are views that the PLS-SEM has not been justified for its appropriateness as an appropriate SEM technique and that it lacks of rigorous statistical and empirical evidence for its claimed advantages (Ronkko et al, 2016). Also, the tests for formative measurement design of leisure constraints and negotiation factors have been inconsistent and extremely limited (Kono et al., 2020??). Further research on PLS-SEM assessments and its justification in leisure studies are in order.

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Chapter 3

EXTENDED UTAUT2 MODEL ANALYSIS OF MOBILE DEVICE USE AND ACCEPTANCE AMONG MOUNTAIN HIKERS: SEPARATION OF PRE, DURING, AND POST USAGE

INTRODUCTION

More than 95% of the world's population lives within areas covered by mobile networks, and more than 81% of the population in developed countries uses the internet every day (Sanou, 2017). There are so far more than 3.2 billion smartphones users worldwide (Statista, 2020). Moreover, in most developed countries, more than two thirds of the population in these countries are using smartphones (Statista, 2018). In other words, we are living in the era of information and communication technology (ICT). ICTs, such as mobile devices, allow individuals to access worldwide information and connect with other users no matter the time, place, or distance (Chun, Lim, & Lee, 2016; Kim & Law, 2015). The advent of mobile ICT was accelerated by the introduction of smartphones. Before there were mobile devices such as smartphones, the internet could only be accessed through computers. The use of the internet with computers is a form of IT (Information Technology), but smartphones made mobile ICT possible by merging mobile phones with computers that use the internet as devices that can be held in one hand.

Mobile apps such as Uber and Airbnb, used on mobile devices, are popular examples of how ICT can be used as an instrument to facilitate actions such as transactions and information searches. They are ICT platforms that connect users anytime and anywhere through mobile devices. Food delivery apps have found great success, and they are getting more popular worldwide every day. Moreover, there are other leisure-activity-related ICTs all around us. There are mobile apps and services for tourism and travel (e.g., Google Maps, Expedia, and Airbnb), mobile apps for sports activities and health (e.g. Nike plus, Nike run, pedometer functions), wearable devices (e.g. smart watches, Google glass, and heart-rate-monitoring sport bras), and many social media services along with O2O (online to offline) services. In fact, O2O services in the context of leisure and recreation activity participation seem promising in their ability to increase the quality of leisure activity experiences. Although O2O apps and services have not become popular or recognized yet, O2O platforms are capable of enhancing leisure activity experiences instantly through mobile devices by assisting individuals find recreation activity partners that match their skill level and available time as well as information about how to locate and access places and current conditions there (Chun, Lee, & Lee, 2017; Gao, Kang, Wang, & Wang, 2014; T. Liu et al., 2016; Shen, Chen, & Wang, 2019).

As new technology increasingly penetrates our lives, research on human acceptance of emerging technologies becomes more important. One of the most reliable theoretical models to assess use and acceptance behaviors toward technology is the Unified Theories of Acceptance and Use of Technology (UTAUT) model by

Venkatesh, Morris, Davis, and Davis (2003). Although the UTAUT model has been frequently used to predict the use of software or digital devices in work environments, few researchers have applied this model to a non-work context, especially that of leisure. Even though the use of mobile devices such as smartphones has become an undeniably crucial part of our lives in recent years, we do not know much about how it has changed our thinking and behavior, particularly during our leisure time. The researchers who have been most active in studying the relationship between the leisure aspect of people's lives and ICT have mainly been affiliated with the field of tourism (i.e., Chun, Lee, & Kim, 2012; Kim, Park, & Morrison, 2008; Kim & Law, 2015; Lepp, 2014a, 2014b; No & Kim, 2014; Oh, Lehto, & Park, 2009; Tussyadiah & Wang, 2016; Van Winkle, Bueddefeld, MacKay, & Halpenny, 2017; Van Winkle et al., 2019; Wang, Park, & Fesenmaier, 2012). Most of their studies investigated mobile devices such as smartphone use by travellers through technology acceptance models and their constructs. As for COVID-19's impact on our society, people are avoiding indoor activities, except for their homes, which causes increased outdoor recreation participation. While there appears to be an increase in visitation to parks and protected areas for recreation during the COVID-19 era, there have not been any UTAUT or UTAUT2 studies done regarding use and acceptance behavior toward mobile devices or their apps in mountain outdoor recreation settings specifically. The impact of mobile technologies now reaches beyond urban to mountain areas, and thus it becomes more necessary to not only accumulate more data on the impact of ICTs on leisure activities and experiences but also to expand the diversity of contexts studied.

There are 26.6 million smartphone users in Canada as of 2019 (Statista, 2020a). Considering Canada's population of around 37 million people, smartphone users in Canada now exceed 70% of the population. In the case of Korea, smartphone users exceed 95% of the population, which is the highest level of smartphone penetration in the world, according to Statista (www.statista.com). Of South Korea's population of 51 million people, there are approximately 48 million smartphone users. In alignment with worldwide ICT trends, both Canada and South Korea show high numbers of smartphone users.

South Korea, which has access to fast internet service and advanced ICT, is one of the world's most digitally connected countries in terms of both coverage and speed of mobile phone service connectivity, whereas Canada has achieved a moderate rank of mobile connectivity and also has relatively expensive consumer costs (Smith, 2016). Due to decades of government-led ICT investment, South Korea became one of the most advanced countries in ICT in the world today (Choung, Hameed, & Ji, 2012; Larson & Park, 2014). In comparison, there are suggestions that Canada has not invested in the ICT industry enough compared to other advanced Western countries (Sharpe, 2005; Van Ark, Inklaar, & McGuckin, 2003). More recently, Canada has been expanding the investment in mobile service industry to chase after ICT leaders in the world but still suffers from relatively higher wireless pricing and higher carrier revenue per data usage than South Korea (Canadian Radio-television and Telecommunications Commission, 2019). Based on the assumption that these differences between the two countries likely impact people and their behavior differently, this study will look into potential similarities and differences of mobile device adoption between Koreans and Canadians in outdoor recreation contexts.

LITERATURE REVIEW

Unified Theories of Acceptance and Use of Technology (UTAUT)

Unified Theories of Acceptance and Use of Technology (UTAUT) is a theoretical model used to assess people's uses of, intentions with, and behaviors toward technology (Venkatesh et al., 2003). The model was built by integrating eight other commonly used behavioral theories for technology acceptance: the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behavior (TPB), the combined theory of TAM/TPB (C-TPB-TAM), the Model of PC Utilization (MPCU), the Innovation of Diffusion Theory (IDT), and Social Cognitive Theory (SCT). The combination of sub factors that achieved the best reliability and validity from the aforementioned theories was formed into the UTAUT model.

Before the UTAUT model emerged, the TAM along with the TRA and the TPB were most commonly used in information technology acceptance research (Agarwal & Karahanna, 2000; Davis, Bagozzi, & Warshaw, 1989; Van der Heijden, 2004). However, concerns have been raised regarding TRA and TPB that these general behavioral theories are limited in explaining ICT's sophisticated interaction since acceptance of advanced technologies are usually unique and relatively a new phenomenon that may be explained better by a model specifically designed to those unique behaviors. Although TAM demonstrated solid predictive power, the need to expand the theoretical scope was noted (Benbasat & Barki 2007; Venkatesh, Davis, & Morris, 2007; Venkatech et al., 2003; Venkatesh, Thong, & Xu, 2012). On that account, UTAUT extends its assessment ability by including social influence and facilitating condition factors as a foundation of TAM-related factors (Brown, Dennis, & Venkatesh, 2010). Thus, UTAUT has an advantage in assessing technology acceptance with more of an integrative perspective, and it actually shows a more statistical fit than the other eight theories (Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012).

UTAUT has four constructs, which are performance expectancy, effort expectancy, social influence, and facilitating conditions. To address the need for a more extended theory that considers more specific (i.e., non-work) contexts and relevant predictors for a richer understanding, Venkatesh et al. (2012) proposed UTAUT2. Since UTAUT was originally developed to assess technology acceptance and use among employees, an extended version of the model was necessary to explain other contexts, such as consumer use (Stofega & Llamas, 2009; Venkatesh et al., 2012). UTAUT2 consists of seven constructs including the four original factors from UTAUT and three added constructs; hedonic motivation, price value, and habit (Venkatesh et al., 2012). Performance expectancy can be defined as how much a user perceives a technologies' benefits in performing certain activities. Effort expectancy characterizes how much a user perceives ease of use in using a technology for certain activities. Social influence can be defined as how a user perceives his or her important others are supportive of using a technology for certain activities. Facilitating conditions describes the access a user has to resources and support in using a technology to perform certain behaviors. Hedonic motivation can be defined as how much a user perceives pleasure or fun in using a technology. The definition of price value is a user's perceived tradeoff between benefit of using a technology and the cost derived from the use. Lastly, habit is known as a user's automatic behavior of using technology due to everyday learning (Escobar-Rodríguez & Carvajal-Trujillo, 2014; Venkatesh et al., 2012).

The UTAUT and UTAUT2 models are generally employed for research in the fields of information system, computer technology, information management, and sometimes in healthcare research (Beh, Ganesan, Iranmanesh, & Foroughi, 2019; Duarte & Pinho, 2019; Hong, Chan, Thong, Chasalow, & Dhillon, 2014; Keong, Ramayah, Kurnia, & Chiun, 2012; Thongsri, Shen, Bao, & Alharbi, 2018; Venkatesh et al., 2003; Venkatesh et al., 2012; Williams, Rana, & Dwivedi, 2015; Yuan, Ma, Kanthawala, & Peng, 2015). However, the model also has proven its predictability in contexts beyond the typical technical fields through research in management, commerce and social science fields (Tamilmani, Rana, & Dwivedi, 2020). Although recently introduced, the UTAUT2 model has been cited in more than 3,000 publications already, and around 23% of those actually utilized UTAUT or UTAUT2 constructs (Tamilmani, Rana, Prakasam, & Dwivedi, 2018; Tamilmani et al., 2019).

UTAUT research in leisure-based tourism and recreation studies

The distinction between leisure research and tourism research can be challenging. Carr (2002) mentioned that there was time when tourism and leisure research are considered as two separate fields and that few theories were exchanged between the two (Harris, McLaughlin, & Ham, 1987; Smith & Godbey, 1991). However, the two fields share common grounds in terms of facilities used, geographical settings, motivations and other psychological aspects (Carr, 2002; Hamilton-Smith, 1987).

When it comes to the differences between tourism and outdoor recreation involved in national parks, differentiating these activities is difficult (McKercher, 1996). For instance, outdoor recreation activity such as mountain hiking may not always be categorized as a tourism activity; a hiker may only be considered as a tourist when he or she is staying overnight away from his or her home (Pomfret & Bramwell, 2016). Although the issue defining recreationists from tourists can be complicated (Davies, 2018), this study would rather exploit this ambiguity in utilizing literature from both recreation and tourism research – in short the focus will be on visitors, irrigardless of their length of stay in the mountain contexts. Previous studies of tourism research regarding ICT use and travel will be consulted most often for the purposes of this current study as the UTAUT and UTAUT2 studies are far more abundant in the field of tourism studies.

There has been much less research into ICT use as a topic of inquiry in leisure studies, and what has been done has been mainly through the the use of qualitative research (Foley, Holzman, & Wearing, 2007; Lepp, 2014a, 2014b; McGillivray, 2014; Millington, 2016; Moscardo & Hughes, 2016). Furthermore, studies regarding ICT's impact on leisure activities that are not tourism related (i.e. recreation activities), and that employ the UTAUT or UTAUT2 models is limited (Chun et al., 2017; Chun & Lim, 2017; Chun et al., 2016; MacKay, Barbe, Van Winkle, & Halpenny, 2017; Van Winkle et al., 2019). On the other hand, tourism researcher have been the most active in investigating the relationship between tourism as a leisure activity and ICT usage (Kim et al., 2008; Lee, Xiong, & Hu, 2012; Rivera, Gregory, & Cobos, 2015; Wang & Fesenmaier, 2013) and many of them have utilized the UTAUT or UTAUT2 model (Escobar-Rodríguez & Carvajal-Trujillo, 2014; Gupta & Dogra, 2017; Lai, 2015; No & Kim, 2014; Oh et al., 2009; Perez-Aranda, Robles, & Urbistondo, 2019; San Martín & Herrero, 2012; Zhang, Seo, & Ahn, 2019).

Although UTAUT and UTAUT2 have been utilized in many of tourism studies, the UTAUT2 model analysis as a framework has not been done enough compared to the TAM. Law, Chan, and Wang's (2018) review of the tourism researches regarding mobile technology use revealed that UTAUT-based modeling represents 7% of the reviewed studies while studies that employed TAM represent 27%. This gap may have happened maily because the UTAUT and UTAUT2 are simply more recent than the TAM (Law et al., 2018). Since the UTAUT and UTAUT2 are considered to be the most predictive models among the other technology acceptance theories (Al-Shafi & Weerakkody, 2010; Khechine, Lakhal, & Ndjambou, 2016), and the fact that UTAUT and UTAUT2 basically include the essential TAM constructs, UTAUT modeling in tourism studies are increasing and should be employed more widely.

However, Tamilmani and colleagues' recent meta-analysis research also mentioned the downside of UTAUT and UTAUT2. Their analysis of UTAUT model performance revealed inconsistent results throughout different subjects and topics (Tamilmani et al, 2020). King and He (2005) and Tamilmani et al. (2020) agreed that this inconsistency problem is not limited to information systems literature but exists across various research fields including the social sciences. Tamilmani et al. (2020) additionally pointed out that the relationship path from effort expectancy (EE) to behavioral intention (BI) has been continuously included and analyzed in the previous UTAUT and UTAUT2 studies even though it yields the most inconsistent and weak outcomes. UTAUT2 analysis in this study is expected to shed some light on whether the upsides and downsides of the UTAUT2 modeling mentioned in previous studies are supportive or not.

Mobile ICT and tourism

Shankar, Venkatesh, Hofacker, and Naik (2010) indicated that mobile communication is considered a main channel for media marketing through applications, messaging, couponing, and social network service. Liu and Law (2013) suggested that ICT devices today and in the future are capable of facilitating easy access to information, hotel booking, transportation arrangement, and service management more than ever. Kim and Law (2015) conducted a literature review on smartphone use and acceptance in the tourism and hospitality sector. They found that the related literature could be divided into five different categories. The first two categories were from marketers' perspectives. Twenty studies explored the relationship between smartphones and marketing in general, and 24 studies reported on the influence of smartphones on tourism. Marketers should take into consideration that smartphone apps are especially helpful for tourism consumers in conducting the necessary "to-dos" of travel (e.g. hotel booking, transport arrangement) by offering convenience and flexibility at the same time (Kim & Law, 2015; Liu & Law, 2013). However, the follow up review study by Law et al. (2018) added that the studies with marketers' perspective only hold 27% of the targeted literatures regarding mobile technology in tourism, thus requiring further attention.

On the other hand, in Kim and Law's (2015) review, the other three categories of research on mobile ICT and tourism were related to consumers' perspectives, which are consumers' perception of mobile marketing, consumers' adoption of smartphone and tourists' perception of smartphones. Law et al. (2018) identified 67 studies focused on the consumers' perspective in their review, which represents 73% of the mobile technology research in tourism. This is majority of the studies focused on marketers' perspectives. Among them, most of the studies' topics were categorized as "motivators/inhibitors of tourists' use/reuse mobile technologies for travel (n=41)" followed by "impact of mobile technologies on consumer travel patterns and behavior (n=17)." (Law et al., 2018, PAGE #).

Specifically, studies regarding consumers' perceived values toward mobile marketing totaled 41 (Kim & Law, 2015). Although relatively small in number, studies on the adoption of smartphones by consumers and tourists were located (i.e., 7 on consumer attitudes and 12 on tourist attitudes). For example, Persaud and Azhar (2012) mentioned that what consumers actually value is not only useful information but also benefits such as convenience, efficiency, flexibility, and relevance (Kim & Law, 2015). Wang and Fesenmaier (2013) asserted that once tourists experienced using mobile devices during their travels, they were more likely to use them again for their future travelling. Verma, Stock, and McCarthy (2012) found some preferences for location-based technology, communication-based technology, and hotel service-based technology among smartphone-using tourists, and they mentioned that these preferences were similar to those of leisure consumers.

Visitors' use of ICT in nature-based contexts

While the definition of leisure-based tourists (overnight visitor) and recreationists (same day visitor) are distinct from each other, both types of visitor can be called a hiker or a park visitor if they participate in hiking activity in mountain parks. This study was essentially interested in hiking participation, regardless of whether a hiker is a tourist or a recreationist, and attempted to represent the participants by the term hiker or visitor throughout the study.

Over 90% of tourists to nature-based destinations are searching for information about hotels and accommodations online, and of these tourists, 40% also book their hotels online (San Martín & Herrero, 2012). Moreover, 48% of travelers around the world now use smartphones for all of their trip planning and hotel booking (Chamberlain, 2018; Think with Google, 2018). A declining number of travelers are sitting in front of their personal computers to complete necessary tasks that facilitate their recreational activities before their trips; instead, they can now take care of everything in one hand at any point before or during their travels on their smartphones or mobile devices.

Elmahdy, Haukeland, and Fredman (2017) asserted several trends regarding ICT's role in nature-based tourism. They mentioned that mobile technology adds values to nature-based tourism by minimizing consumer's costs and offering tourists with control over travel planning and budgeting. As the mobile service coverage expands to the remote areas such as mountains and rural nature, tourists will be encouraged to plan for newer experience and visits. The smartphone and its ubiquitous internet services are making this facilitation faster than ever for nature-based tourists (Buckley, Gretzel, Scott, Weaver, & Becken, 2015; Elmahdy et al., 2017).

Social media is also one of the trends in nature-based tourism that is heavily related to mobile technology. The benefit of natural tour information access through mobile technology includes a wide variety of personal postings and recommendations on social media platforms (Elmahdy et al., 2017). There are negative impact cases such as the viral sharing of a beautiful, yet poorly regulated scenic location posted on social media, which results in damage to the site's natural environment due to crowding (Pearce & Moscardo, 2015), Conversely, information and photos of natural areas on the social media can help nature-based tourists understand the impacts of their behavior and engage in environmentally responsible visitor activities (Elmahdy et al., 2017; Hausmann et al., 2018).

In terms of UTAUT2 studies of mountain outdoor recreation and those who participate in it, there appears to be no relevant study completed to date. The closest related studies from tourism/recreation research are conducted by Van Winkle and colleagues on experiences with mobile devices and their use at festivals, which is one of the outdoor recreation settings examined through UTAUT2 modelling (Van Winkle et al., 2017; Van Winkle, Cairns, MacKay, & Halpenny, 2016; Van Winkle et al., 2019). A couple of tourism studies regarding sport-based and mapping application use can be seen as UTAUT-related studies as well (Gupta & Dogra, 2017; Shoval & Ahas, 2016). Additionally, a few of the sport industry and leisure studies utilizing UTAUT explored the use of sport/fitness apps (Lee, Kim, & Wang, 2017; Perez-Aranda et al., 2019; Yuan et al., 2015), sport wearable devices (Chun & Lim, 2017; Chun et al., 2016; Seol, Ko, & Yeo, 2017), and leisure sport marketing (Sa, Han, & Lee, 2019). However, these studies are still topically far from being considered specific to mountain outdoor recreation. Considering the significant impact of mobile technology on nature-based tourism, there is lack of empirical studies about the specific topic. Thus, a theoretical approach to mountain outdoor recreation via UTAUT modeling is needed to understand that particular leisure behavior.

Safety factor addition to UTAUT2

In order to grasp mountain hikers' experiences and behavior in using mobile devices through the UTAUT model, the context should be addressed by extending the model. Mountain environments are unique among outdoor recreation settings due to their remoteness, unpredictability, orienteering problems, and the potential risk to get injured or lost is a possibility, even for experienced hikers (Bettini & Mascetti, 2016). Mountain and natural environment research discusses this crucial safety issue (Boller, Hunziker, Conedera, Elsasser, & Krebs, 2010; Darcy, 2016; Floyer, 2013; Sharp, 2001). In Boller et al.'s (2010) study on hiking tourism development of remote mountain areas, seven factors including management/service, accessibility, safety, naturalness of the physical environment, social factors, human impact, and legal rights/freedom were used to measure mountaineers' attitudes toward mountain development. Of those seven categories, one of the items used to measure safety factors was related to improving cellular phone coverage throughout mountain areas, which indicates the importance of connectivity for mobile device use with regards to mountain safety.

In fact, according to Sharp (2001), mobile phones have the function of cutting down time for alerting rescue services, and it is evident that over half of all rescue efforts in mountain areas are a result of mobile phone calls. More recently, many efforts have been made to develop smartphone apps and systems, such as smartphone avalanche search apps (Floyer, 2013) and mountain safety assistant systems (Bettini & Mascetti, 2016), for ensuring the safety of mountain hikers. These applications and systems are mainly based on the functionality provided by mountaineers' mobile devices with GPS, various sensors, and cellular connectivity. The common precautions that both studies mentioned are cellular coverage and the battery span of mobile devices (Beh et al., 2019; Floyer, 2013).

The negative impacts of using mobile devices for mountain activities have also been discussed (Lepp, 2014a, 2014b; Martin, 2017; Martin & Pope, 2011). While mobile phones or devices may be effective in increasing outdoor recreation participation by reducing perceived risk, they may also encourage hikers who are beginners to engage in riskier behaviors that could lead to serious accidents (Lepp, 2014a). For example, beginners might go into the wilderness without the proper preparation and education, believing that the information provided by their smartphones tells them everything they need to know. This false sense of security has been studied by researchers such as Martin and colleagues (Martin, 2017; Martin & Pope, 2011; Martin & Blackwell, 2016). Thus, the ongoing debate around safety issues with using mobile devices in mountain activity settings needs to be considered when applying the UTAUT model to examine mountain hikers' behavior. Due to the UTAUT model's adaptability, this study will extend the UTAUT2 model by adding a safety factor as a new construct (Venkatesh et al., 2012).

The mobile device use experience before, during, and after

Research from Google in partnership with Phocus Wright on people's travel indicated that over 70% of surveyed U.S. travelers indicated they are constantly on their smartphones when traveling to navigate, search and book for attractions or activities, and more (Think with Google, 2018). When thinking of the topic of mobile device use in mountain hiking contexts, it is easy to picture hikers using functions such as accessing navigation/mapping (GPS), checking the weather forecast, communicating with others, making rescue calls, and taking pictures (Warner, Adanin, & Szolosi, 2020). However, mobile device use for hiking is not limited to in situ-use. Tussyadiah and Wang (2016) mentioned that mobile technology assists tourists at three different stages including pre-trip (anticipatory), on-site (experiential), and post-trip (reflection). For instance, as San Martín and Herrero

(2012) and Van Winkle et al. (2019) have mentioned, the majority of tourists, including those who visit nature-based destinations, are booking their accommodations online and on their smartphones with services such as TripAdvisor. The hotel industry is also aware of this shift in terms of the increased popularity of accommodation reservation channels and the role of mobile ICT in catering to these needs (Zhang et al., 2019). This type of mobile device use is an example of pre-hike use.

Posting pictures and sharing experiences with others through social media are examples of post-hike use. Van Winkle et al. (2019) noted that using mobile devices, allows social media users to share/review experiences and influence others and also be influenced by others' postings. Robertson, Yeoman, Smith, and McMahon-Beattie (2015) also observed that social media is capable of transforming people's experiences by increasing inclusion and access to activities. Although these studies specifically examined festivals, it is reasonable to suggest that the findings from these studies would be valid in mountain outdoor recreation contexts as well. This study will attempt to document mountain hikers' behavior in using mobile devices throughout all three stages by categorizing measurement for use before, during, and after the hiking activity.

Cultural differences and similarities between Canada and Korea

Pahnila, Siponen, Myyry, and Zheng (2011) highlighted four reasons explaining the inconsistent findings among empirical studies utilizing the UTUAT model. The first reason is that there are different application domains. UTAUT modeling is widely used not only in computer and information system sciences but also in applied research fields such as health care, tourism, management, and e-commerce. In that regard, the results may vary according to the specific contexts of each field. The second reason is related to different statistical techniques. UTAUT has been conducted mainly through structural equation modeling (SEM). SEM analysis results could vary between CB-SEM (covariance-based) and PLS-SEM (partial least square), but some studies also simply used multiple regression analysis of UTAUT factors. With regard to the third reason, different levels of rigor have been applied in the use of statistical techniques. This may be a universally valid reason for all scientific research producing inconsistent results. Lastly, the fourth reason, asserted by Pahnila et al. (2011), is that there are cultural differences in the results derived from data that were collected from different countries, and this is a topic that this study will be focusing on. Culture can be defined as "patterns of thinking, feeling and potential acting, which have been learned throughout a lifetime, and which are likely to be used repeatedly and unlikely (or difficult) to be changed by the individual (p. 38)" (Nistor, Lerche, Weinberger, Ceobanu, & Heymann, 2014).

Nistor et al. (2014) aimed to compare the educational technology acceptance behavior of those living in Germany and Romania by examining factors such as individualism (vs. collectivism) and masculinity (vs. femininity) as precedent variables to UTAUT. They found Romanians to be less individualistic and more masculine than their German counterparts. Similarly, Pahnila et al. (2011) also examined how individualistic and collectivistic values affect UTAUT variables differently in the context of using a Chinese online auction site. While individualistic values significantly affect all four UTAUT factors, collectivistic values did not appear to have a strong effect on facilitating conditions.

An earlier study by Markus and Kitayama (1991) brought up the issue of cultural differences that potentially exist between Eastern and Western cultures. Their self-construal theory suggested that Western Europeans and North Americans tend to hold more independent self-construal, whereas Eastern Asians tend to show more interdependent self-construal. The dichotomy of the self-construal aligns with studies comparing individualistic and collectivistic values such as studies by Pahnila et al. (2011) and Nistor et al. (2014).

Beside the fact that ICT infrastructure exists under different conditions between Korea and Canada, with differences in mobile connectivity and coverage rate along with speed rate (Craven, 2019; Smith, 2016), the attitude and value the two cultures have toward both mobile devices and mountain resources use may be different as well. According to Shin, Jaakson, and Kim (2001), one of the problems Korean national parks face is a lack of management policies that maximize benefits to visitors. The current policies are weak in promoting visitors' relationships with nature, and the desire to escape and learn about nature; instead, the policies are biased towards physical resources and inventories installation. Lee and Bürger-Arndt (2008) also pointed out that there are different management styles in different cultures. While the installation and furnishing of mountain resources (e.g. stairs, safety fence, overpass bridge, etc) plays an important role in Korean park management, Western countries such as Germany and Canada focus heavily on outdoor program content and maintaining ecological integrity in natural parks (Haider, Anderson, Beardmore, & Anderson, 2004; Lee & Bürger-Arndt, 2008).

In terms of mobile device adoption, Chun et al. (2012) studied hedonic and utilitarian value perceptions of using smartphones among Korean college students. They revealed that utilitarian value was more significant than hedonic, although both values played important roles. Perhaps the aforementioned value dispositions in park management and smartphone adoption are suggestive of Koreans' relative tendency toward pursuing utilitarian values in comparison with other cultures. This study intends to examine this assumption as a research hypothesis.

RESEARCH MODEL AND HYPOTHESIS

The objective of this study was to test and extend the UTAUT2 model in order to improve its prediction of recreation activities in outdoor recreation settings such as during mountain hiking. Additionally, this study examined the differences between mobile device use and acceptance between Canadians and South Koreans.

Finally, the study was designed to examine mobile device use for three distinct phases of a hiking trip: preparation for, during, and after the hiking activity.

Research questions:

1. Is the UTAUT2 model suitable for predicting mountain hikers' use and acceptance (BI) of mobile devices for mountain hiking activities?

2. Does adding a safety expectancy variable to UTAUT2 improve the model's prediction of mobile device use and acceptance (BI) for mountain hiking?

3. What are the differences and similarities between Canadians and Koreans mountain hikers?

4. What are the differences and similarities among age groups?

5. To what degree does each UTAUT2 variable predict mobile device use for mountain hiking?

6. To what degree do UTAUT2 variables' prediction of mobile device use for mountain hiking vary across country context?

7. Do the UTAUT2 variables' prediction of mobile device use for mountain hiking vary with trip phase (i.e., before, during, and after activity)?

Hypothesis:

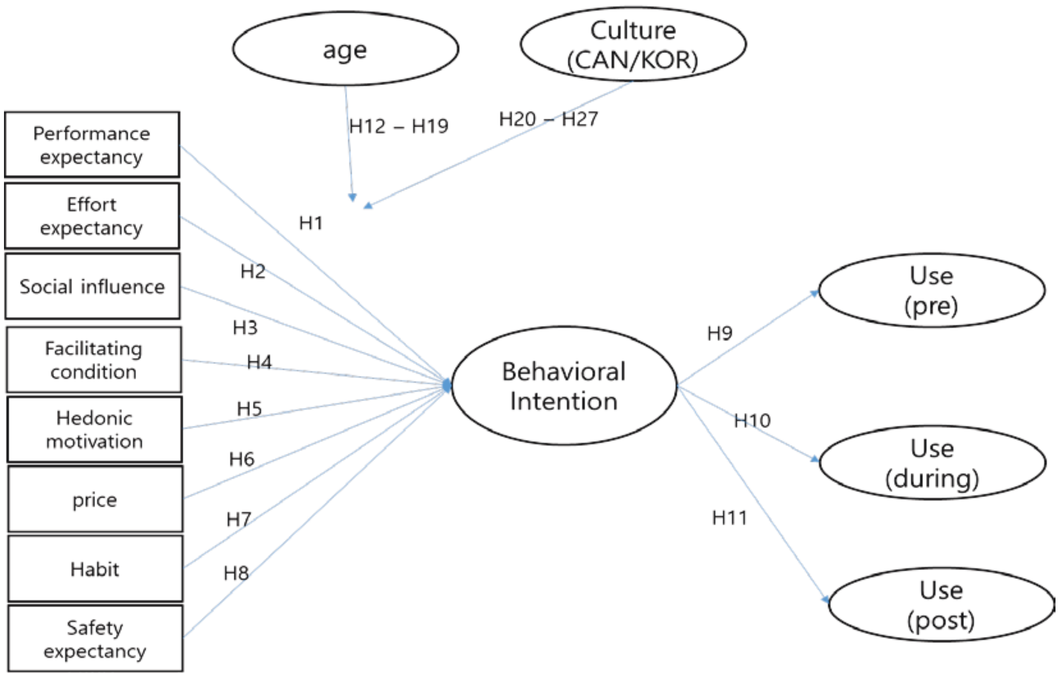


Figure 3.1. Research hypotheses

H1: Performance expectancy will positively influence behavioral intention.

H2: Effort expectancy will positively influence behavioral intention.

H3: Social influence will positively influence behavioral intention.

H4: Facilitating condition will positively influence behavioral intention.

H5: Hedonic motivation will positively influence behavioral intention.

H6: Price will positively influence behavioral intention.

H7: Habit will positively influence behavioral intention.

H8: Safety expectation will positively influence behavioral intention.

H9: Behavioral intention will positively influence preparation use.

H10: Behavioral intention will positively influence during use.

H11: Behavioral intention will positively influence after use.

H12 – H19: Age will moderate all the hypothesized relationships.

H20 – H27: Culture will moderate all the hypothesized relationships.

H28 – H51: Behavioral intention will mediate the impacts of UTAUT2 constructs on pre-, during and post-hike mobile device use.

METHOD

Participants

The study procedures were approved by the ethics committees of the both the University of Alberta and the Yonsei University. Hikers and trail users from South Korea and Canada were the target population for this study. Hikers and trail users of mountain parks in Canada (Banff and Jasper National Parks and provincial parks located east of Banff in Kananaskis Country; summer 2019) and South Korea (Seorak and Bukhan National Parks; spring 2020) were contacted and included in the survey once they agreed to participate. The participants were provided with either a tablet PC to respond to the electronically formulated questionnaire or a paper-based version of the questionnaire to answer, although a very small number of paper-based questionnaires were collected only in the Canadian survey. Participants who agreed to participate but did not have time to finish the questionnaire on-site were given an online link to the online questionnaire.

Participants were informed that the survey was completely voluntary and that they could choose to stop and quit at any time during the survey. Participants were also able to refuse to answer any questions they felt uncomfortable answering. However, once participants handed in their completed questionnaires to surveyors, they were not allowed to withdraw the data. The entire survey was anonymous. No personal-specific questions were asked. Participants who completed the survey on-site were compensated with chocolate or snacks as a small token of appreciation.

The sampling method was convenience sampling, which took place in public spaces among parks such as trail heads, parking lots, visitor or information centers. Certain efforts to stratify the sample were put into place. For instance, questionnaires were distributed and collected during both weekdays and weekends to secure a more general sample population. Additionally, every fifth person that surveyors encountered was approached in relatively crowded sites, such as parking lots, information centers, trailheads, and front-country areas, whereas people who were encountered in back-country trails were asked to participate at every appropriate opportunity.

Efforts were made to obtain as heterogeneous sample of hikers as possible. We sampled at locations where both day and overnight hikers frequented, and a variety of hiking trails – from 1 hour easy to 8 hours+ challenging hikes were possible. We were interested in sampling hikers with a high degree of hiking experience, frequently engage in hiking and who found it easy to negotiate barriers to engage in hiking, as well as those who were characterized by low frequencies of hiking or hiking experience and may experience more constraints

A sample size of 400 respondents was set at the goal for data collection efforts. The target sample size for this study was calculated using the "A-priori Sample Size Calculator for Structural Equation Models" available online (Soper, 2020), which is based on the suggestion by Cohen (1992) regarding analysis power and sample size. In deciding effect size, a large effect size was chosen because the previous UTAUT2 model studies with similar topics and characteristics showed a mostly large effect in their coefficient correlation and R-square values around 0.6 (Escobar-Rodríguez & Carvajal-Trujillo, 2014; Gupta & Dogra, 2017; Perez-Aranda et al., 2019; Yuan et al., 2015; Zhang et al., 2019). An effect size of 0.6, a power level of 0.8, a probability level of 0.05, and 12 latent variables yielded a minimum sample size of 241 in calculation.

This study employed PLS-SEM instead of traditional structural modeling (CB-SEM). The rule of thumb given by Hair, Hult, Ringle, and Sarstedt (2016) for sample size of PLS-SEM analysis with 10 construct relationships at an effect size of

0.5-0.6, a power level of 0.8, and a probability level of 0.05 suggests 59 samples. The model of this study has 11 construct relationship arrows. Thus, around 60 samples per country in which surveys took place were needed. Considering the different sample size suggestions from two calculation methods, 200 samples from each population was anticipated to produce a sufficient sample size.

Measurement

The survey measurements were designed in English first for the Canadian survey. The Korean version of the questionnaire was formed after the English version was finalized. The UTAUT and UTAUT2 models have been measured and assessed in the Korean language by Korean researchers previously (Byun, Cho, & Bae, 2017; Chun & Lim, 2017; Chun et al., 2016; Sa et al., 2019; Son, Lee, & Cho, 2014). The Korean-translated items from previous studies were borrowed as baseline items, but the study also employed a translation process using back translation and parallel translation involving six bilingual translators in order to better refine UTAUT2 measurements in Korean. Back-translation is described as one of the most valid translation methods (McGorry, 2000), and the parallel translation method is capable of making up for any weaknesses that back-translation may have (Malhotra, Agarwal, & Peterson, 1996).

The UTAUT2 model was extended with the safety expectancy factor to better accommodate mountain activity contexts. Thus, the extended UTAUT2 model of this study consisted of eight factors. The performance expectancy factor was measured by four items, and the factor measurements were borrowed and combined from models such as TAM, C-TAM-TPB, MM, MPCU, IDT, and SCT (Venkatesh et al., 2003). The effort expectancy factor was measured by four items that were based on constructs from models such as TAM, MPCU, and IDT. The social influence factor was measured by two items that were combined from models such as TRA, TAM, C-TAM-TPB, MPCU, and IDT. The facilitating conditions factor's measurements were from four items that were combined from constructs of TPB, C-TAM-TPB, MPCU, and IDT models. The hedonic motivation factor represents means of fun and pleasure that may emerge from using a technology (Venkatesh et al., 2012), and this was measured by three items. The price value factor was measured by four items, and this factor can measure whether "the benefits of using a technology are perceived to be greater than monetary cost" (Venkatesh, 2012, p. 161). Habit factor measurements were composed of four items designed to capture the extent to which or whether using a technology has become a habit for people or not. The measurements for hedonic motivation, price value, and habit were developed in the UTUAT2 model development study by Venkatech et al. (2012). The detailed items used in this study are shown in Table 3.1.

The newly added safety factor's measurements were developed for this extended UTAUT2 study. Measurement items such as "Using my mobile device for hiking makes me safer," "I feel comfort when hiking with my mobile device," "My mobile device is a useful safety tool for my hiking," and "My mobile device helps me identify safe hiking" were used. The items created were inspired by and based on the existing research regarding mountain visitors' safety-related behaviors (Bettini & Mascetti, 2016; Boller et al., 2010; Floyer, 2013; Sharp, 2001).

Factors such as age, gender, and experience have been considered effective moderating variables for the UTAUT2 variables as part of the model (Venkatesh et al., 2003; Venkatesh et al., 2012). Although these three moderators have not always been included in previous studies, there are a number of studies that have successfully identified their moderating effect (Williams et al., 2015). This study adapted and tested the moderating effect of age as the UTAUT2 model originally intended. Additionally, the experience variable was replaced by the culture variable in this study as another moderator to capture differences and similarities between Korean and Canadian hikers.

Analysis

Although most of the structural modeling studies used CB-SEM including in tourism and recreation research, PLS-SEM should be considered more often for research with purposes appropriate to the purpose of PLS analysis (do Valle & Assaker, 2016; Kono, Ito, & Loucks-Atkinson, 2018; Kono, Ito, Walker, & Gui, 2019; Kyle & Jun, 2015). PLS-SEM analysis was used for this study for two reasons. First, the eight constructs of the extended UTAUT2 model in this study could be explained better when uncorrelated to each other because each construct is supposed to represent unique dimensional personal experience and states (Hair et al., 2016). The CB-SEM do not allow model calculation when exogenous variables are uncorrelated, while PLS-SEM does not require correlation among exogenous variables.

Secondly, the UTAUT and UTAUT2 models were originally developed through PLS analysis (Venkatesh et al., 2003; Venkatesh et al., 2012). There was presumably a reason that PLS was chosen. Due to its non-parametric assumption and flexibility in modeling, PLS-SEM makes a reliable tool for model development and exploring new relationships, which is possible with even a relatively small sample (do Valle & Assaker, 2016; Hair et al., 2016). This study intended to use the UTAUT2 model with the new extension of the safety expectancy factor, which makes it a good fit for using PLS-SEM.

Validity and reliability of measurements

Using the SmartPLS program, the measurement model was assessed. Internal consistency reliability was tested by the calculation of composite reliability (CR). Convergent validity was tested by the calculation of AVE (average variance extracted) value. All the constructs' CR values were above 0.7 and the AVE values were above 0.5; therefore, the constructs' reliability and the convergent validity were statistically supported.

Discriminant validity was examined using the heterotrait-monotrait ratio of correlation measure (HTMT). Recent guideline studies suggest using the HTMT assessment over the typical Fornell-Larcker criterion for the superior performance of the former (Duarte & Amaro, 2018; Henseler, Ringle, & Sarstedt, 2015). All the measurements yielded HTMT values lower than a conservative threshold of .90 (Duarte & Amaro, 2018; Gold, Malhotra, & Segars, 2001; T. S. Teo, Srivastava, & Jiang, 2008). The discriminant validity of the measurements was statistically supported.

Lastly, the content validity of the questionnaire items used in this study was verified by two professors in the leisure studies field and by two others with PhD degrees in the sports and leisure fields. The measurement items and their validity and reliability test results are shown in Table 3.1.

Table 3.1. Mean/Standard deviation and Confirmatory factor analysis

constructs	items	M	S.D.	CR	AVE
performance expectancy	My mobile device is useful for my hiking	3.73	1.057	.920	.742
	For hiking, my mobile device increases the chance of achieving important things.	3.40	1.149		
	Using my mobile device helps accomplish things more quickly for hiking.	3.46	1.120		
	I can save time when I use my mobile device for my hiking.	3.38	1.129		
Effort expectancy	Learning how to use my mobile device for my hiking is easy	3.63	1.057	.924	.752
	For hiking, my interaction with my mobile device is clear and understandable.	3.52	1.056		
	My mobile device is easy to use for hiking.	3.63	1.036		
	It is easy for me to become skillful at using my mobile device for hiking.	3.55	1.062		
Social influence	People who are important to me think that I should use my mobile device for my hiking.	3.07	1.119	.929	.814
	People who influence my behavior think that I should use my mobile device for hiking.	2.95	1.095		
	People whose opinions that I value prefer that I use my mobile device for hiking.	3.06	1.070		
Facilitating condition	I have the necessary data connectivity to use my mobile device for hiking.	3.27	1.219	.868	.623
	I have a sufficient source of electric power to use my mobile device for hiking.	3.58	1.093		
	I have the knowledge necessary to use my mobile device for hiking.	3.67	1.056		
	I feel comfortable using my mobile device for hiking.	3.64	1.054		
Hedonic motivation	Using my mobile device for hiking is fun.	3.25	1.122	.923	.800
	Using my mobile device for hiking is enjoyable.	3.29	1.100		
	Using my mobile device for hiking is very	2.80	1.134		

	entertaining.				
Price	I can save money by using my mobile device for hiking.	3.03	1.086	.885	.661
	Using my mobile device for hiking offers excellent value for my money.	3.23	1.035		
	The price of using my mobile device for my hiking is reasonable.	3.43	0.974		
	The price of using my mobile device for hiking is affordable.	3.41	1.037		
Habit	Using my mobile device for hiking has become habit for me.	3.26	1.272	.894	.682
	I am addicted to using my mobile device for hiking.	2.33	1.152		
	I must use my mobile device for hiking.	2.66	1.268		
	Using my mobile device for hiking has become routine for me.	3.17	1.208		
Safety	Using my mobile device for hiking makes me safer.	3.54	1.113	.924	.753
	I feel comfort when hiking with my mobile device.	3.60	1.080		
	My mobile device is useful safety tool for my hiking.	3.67	1.063		
	My mobile device helps me identify safe hiking conditions.	3.67	1.013		
Behavioral intention	On this trip, and for future hiking trips I intend to continue using a mobile device for my hiking.	3.84	1.096	Single indicators	
Actual use of mobile device	How often to do you use your mobile device to prepare for a hiking trip?	3.23	1.240		
	How often do you use your mobile device during hiking?	2.79	1.135		
	After hiking, how often do you use your mobile device to share, document and reflect on your most recent hiking trip?	3.02	1.255		

RESULTS

Descriptive statistics

A total of 432 hikers from Canada and South Korea agreed to participate in the survey. Thirty-three responses with a significant amount of missing values were deleted from among the initial participants. A total of 399 responses from Canadian hikers and South Korean hikers were used for the final analysis. The response rate was around 92%. The responses with ignorable missing values were tested with Little's MCAR test, and the result indicated that the missing values were statistically missing at random. For the Canadian sample, Little's MCAR test yielded non-significant results (Chi-square =2285.908, df =2183, p =.061). In the case of the South Korean sample, Little's MCAR test did not converge, but the separate variance of t-tests was all non-significant. The EM algorithm missing value replacement method was conducted to complete the final dataset for the analysis. The normality of the dataset was then calculated for its skewness and kurtosis. It is still important not to use data with overly non-normal distribution in the PLS-SEM, despite its non-parametric assumption (Hair Jr et al., 2016; Kono et al., 2019). All of the statistics for the distribution were well within the range of -3/+3. Thus, the dataset represents close to normality.

Table 3.3. shows the result of the frequency analysis of the participants. The Canadian sample consisted of 187 (46.9%) respondents, and the South Korean

sample consisted of 212 (53.1%) respondents. Gender was almost equally sampled; there were 200 male participants (50.1%) and 197 (49.4%) female participants. There were only two participants who classified their gender as either ‘other’ or ‘preferred not to answer’. Participants holding bachelor’s degree were the most frequent (37.6%), followed by participants with graduate degrees (26.6%). On the day they were intercepted for the survey, the majority of the participants (62.4%) had conducted 1 to 3 hours of hiking, followed by the number of participants whose hiking trips had been more than 3 hours (25.1%), 1 hour or less (10%), and overnight (2.5%). Hiking trip frequency of the participants was grouped into four groups. The groups included hikers who hiked once a season or less (30.1%), more than once a season to once a month (32.9%), more than once a month to once a week (27.4%), and more than once a week (9.8%). Most of the participants brought their smartphones on their hiking trips (91%). Some participants brought a combination of smartphones and other mobile devices such as tablet PCs or smartwatches (6.5%). Only 1.25% of the participants brought tablet PCs only; another 1.25% of the participants did not use any mobile devices in relation to their hiking. The mean age of the participants was 40.3 years old, and the average of the participants’ perceived hiking experience levels was 58.8 out of 100.

Table 3.2. Frequency analysis of demographics (overall sample)

		n	%
Country	Canada	187	46.9
	South Korea	212	53.1
Gender	Male	200	50.1
	Female	197	49.4
	Other/Prefer not to answer	2	0.5
Education	Elementary school	9	2.3
	High school	52	13.0
	College diploma/apprenticeship	44	11.0
	Some university	38	9.5
	University Bachelor's degree	150	37.6
	University Graduate's degree	106	26.6
Hiking duration	1 hour or less	40	10.0
	1 to 3 hours	249	62.4
	More than 3 hours day trip	100	25.1
	Overnight trip	10	2.5
Hiking frequency	Once a season or less	120	30.1
	More than once a season -Once a month	131	32.9
	Morea than once a month -Once a week	109	27.4
	More than once a week	39	9.8
Type of mobile device using	Smartphone	363	91.0
	Tablet PC	5	1.25
	Combination of smartphone and other devices (tablets or smartwatch)	26	6.5
	Do not use one	5	1.25
Total n		399	

	Mean	SD
Age	40.3	16.2
Perceived experience level at hiking	58.8/100	22.0

Table 3.3. Frequency analysis of demographics (separate cultural groups)

		CAN (n=187)	%	KOR (n=212)	%
Gender	Male	82	43.9	118	55.7
	Female	103	55.1	94	44.3
	Other/Prefer not to answer	2	1.1	0	0
Education	Elementary school	3	1.6	6	2.8
	High school	15	8.0	37	17.5
	College diploma/ apprenticeship	20	17.7	24	11.3
	Some university	8	4.3	30	14.2
	University Bachelor's degree	76	40.6	74	34.9
	University Graduate's degree	65	34.8	41	19.3
Hiking duration	1 hour or less	22	11.8	18	8.5
	1 to 3 hours	114	61.0	135	63.7
	More than 3 hours day trip	42	22.5	58	27.4
	Overnight trip	9	4.8	1	0.5
Hiking frequency	Once a season and less	49	26.2	71	33.5
	More than once a season - Once a month	76	40.6	55	26.0
	Morea than once a month - Once a week	50	26.7	59	27.9
	More than once a week	12	6.4	27	12.7
Total n		187		212	

	Mean	SD	Mean	SD
Age	35.1	14.2	45	16.4
Perceived experience level at hiking	60.6/100	22.1	57.2/100	21.8

Structural model specification and validation

The structural model of this study is shown in Figure 3.2. The indicators of the exogenous UTAUT2 variables are reflectively formulated, including the extended safety expectancy variable. The reflective measurement specification for the safety expectancy was validated in the measurement model validity. The behavioral intention to use mobile devices for hiking and the actual use of mobile devices in pre-, during, and post-hike stages are measured with single indicators.

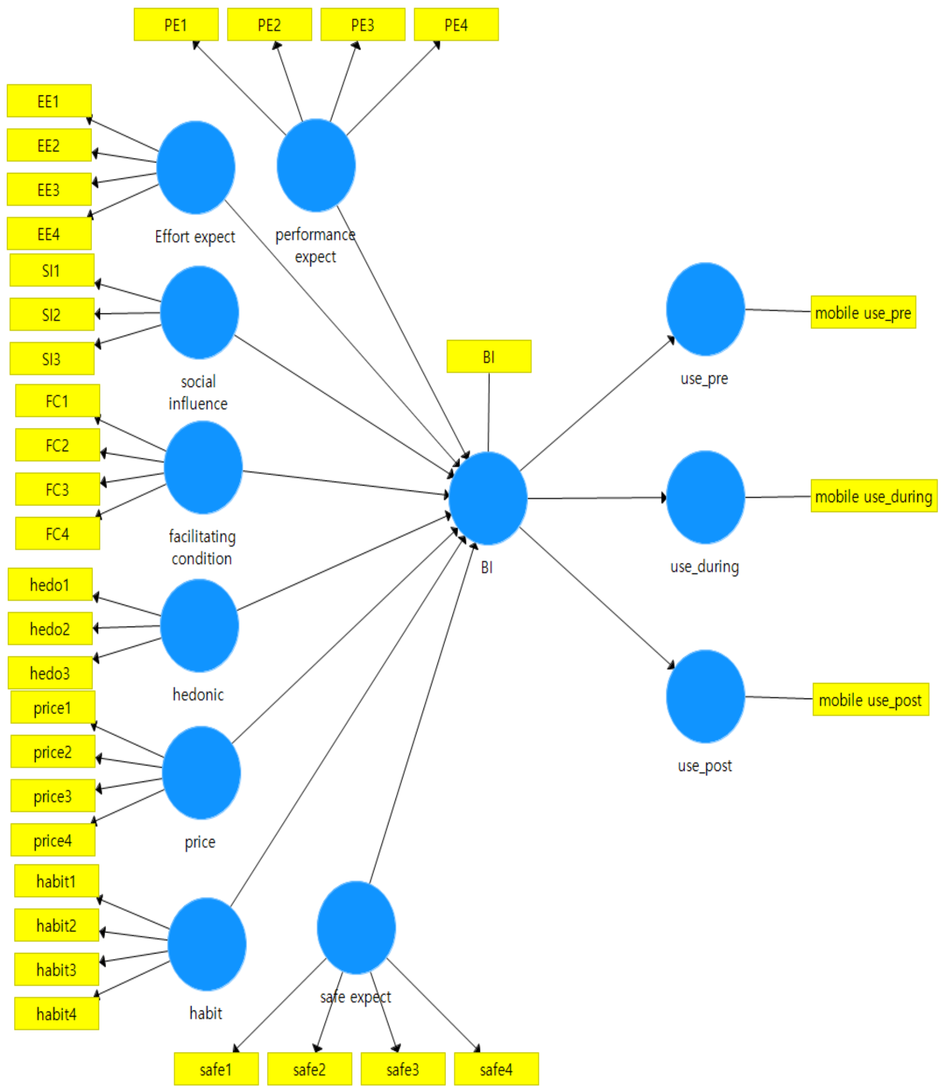


Figure 3.2. PLS-SEM model specification

The VIF (variance inflation factor) values were examined for the structural model's multicollinearity issue. VIF values of all the indicators in the model were under three except for hedonic 1 (VIF =3.017), but a VIF under five is still the conservative threshold (Hair Jr, Sarstedt, Ringle, & Gudergan, 2017; Kono et al., 2019). The R-square values of endogenous variables were .552 for behavioral intention (moderate), .229 for mobile device use in the pre-hike stage (small), .216 for mobile device use in the during-hike stage (small), and .133 for the mobile device use in the post-hike stage (small). The f-square values were smaller than anticipated except for the small effect size between the facilitating condition and behavioral intention (f-square =.023), the moderate effect size of the path from safety expectancy to behavioral intention (f-square =.123), and moderate-large effect size among the paths from behavioral intention towards the three stages of use (.297, .275, and .157, respectively). The guideline for effect size f-square suggests 0.02 as a small, 0.15 as a medium, and 0.35 as a large effect (Cohen, 1988). The VIF, R-square, and f-square values were calculated through the PLS algorithm procedure.

Structural model analysis results

A bootstrapping analysis with 5,000 subsamples and the BCa option was executed for the final results of the structural model and its paths. Performance expectancy had a significant positive impact on behavioral intention (β= .135, p =.039). The effort expectancy's effect on behavioral intention was non-significant (β= -.082, p =.168). The path between social influence and behavioral intention was non-significant (β= -.039, p =.458). The facilitating condition had a significant positive impact on the behavioral intention (β= .186, p =.002). Both the hedonic value and the price constructs did not yield a significant coefficient toward behavioral intention (β= .085, p =.163 and β= -.029, p =.612, respectively). The habit construct was positively and significantly related to behavioral intention (*ß*= .156, *p* =.009). The safety expectancy, which was added and extended the UTAUT2 model in this study, had the largest significant effect among the other UTAUT2 variables (*ß*= .407, *p* <.001). The impact of the behavioral intention on the three separate stages of actual use of mobile devices (pre, during, and post) were all significant, with *p*-values smaller than .001 (*ß*= .478, *ß*= .465, *ß*= .368, respectively). In conclusion, the hypotheses H1, H4, H7, H8, H9, H10, H11 were statistically supported. The outcomes are as shown in Table 3.4. Also, the PLS path analysis results including path coefficients, outer loadings, R-square values are shown in Figure 3.3.

Table 3.4. The path analysis and bootstrapping results (overall sample)

Path coefficient	ß	t	Sig.	f^2
performance expect -> BI	.135	2.06	.039	.012
effort expect -> BI	-.082	1.377	.168	.006
social influence -> BI	-.039	.742	.458	.002
facilitating condition -> BI	.186	3.061	.002	.023
hedonic -> BI	.085	1.395	.163	.006
price -> BI	-.029	.508	.612	.001
habit -> BI	.156	2.601	.009	.019
safety expect -> BI	.407	7.269	.000	.123
BI -> use_pre	.478	11.128	.000	.297
BI -> use_during	.465	11.353	.000	.275
BI -> use_post	.368	7.748	.000	.157

Specific indirect effect	ß	t	Sig.	VAF
performance expect -> BI -> use_post	.050	2.01	.045	1.00 (full)
performance expect -> BI -> use_pre	.065	1.979	.048	1.00 (full)
Facilitating condition → BI → during use	.086	2.849	.004	1.00 (full)
facilitating condition -> BI -> use_post	.068	2.686	.007	1.00 (full)
facilitating condition -> BI -> use_pre	.089	2.806	.005	1.00 (full)
habit -> BI -> use_during	.073	2.406	.016	1.00 (full)
habit -> BI -> use_post	.057	2.397	.017	1.00 (full)
habit -> BI -> use_pre	.075	2.485	.013	1.00 (full)
safe expect -> BI -> use_pre	.195	5.824	.000	1.00 (full)
safe expect -> BI -> use_during	.189	5.885	.000	1.00 (full)
safe expect -> BI -> use_post	.150	4.817	.000	1.00 (full)

BI: Behavior Intention

Mediation analysis

All the UTAUT2 constructs that have significant impact on the behavioral intention were involved in the significant mediation effects as seen in Table 3.4. Although, performance expectancy was the only exogenous variable among the significant mediation paths that was not connected to the mobile device use during hiking. The effect size and the path coefficient of performance expectancy were the lowest among the four significant relationships to begin with. The particular disconnect toward during use indicates and supports that hikers find their mobile device relatively less helpful while hiking. Also, the mediation paths reflecting the proposed influence of UTAUT2 variables on mobile device use after hiking are slightly lower than the other two stages of use (before and during).

Moderation analysis

The moderating effect of age and culture (country) were analyzed. The age in this study was a continuous variable. Thus, moderation analysis between the eight exogenous UTAUT2 variables and behavioral intention using an orthogonalization approach was performed. The orthogonalization approach interaction analysis with a mean-centering method is known to have advantages over other approaches, such as the product indicator and the two-stages in minimizing estimation bias and maximizing prediction accuracy (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). As a result of the moderation analysis, the age variable did not have a moderating effect on any paths in the structural model in this study.

Multi-group analysis (PLS-MGA) was performed to examine the moderation effect of culture variable. Culture variable is dichotomy categorical variable, which is greatly compatible with PLS-MGA. However, the MICOM (Measurement in Variance of Composite Models) procedure is required as a prerequisite.

The MICOM for the culture (country) was examined. The MICOM test for culture differences through permutation analysis did not converge. Particularly, permutation p-values from MICOM step 2 with regard to the effort expectancy, the facilitating condition, the performance expectancy, and the safety expectancy variables were significant. The significance of a permutation p-value indicates that the PLS-MGA between the moderating groups is invalid because the measurement's compositional invariance is not supported statistically (Hair Jr et al., 2017). The non-invariance in measurements between the groups are indicating that the two national samples are similar, possibly as mountain hikers, although they are from different cultures. Table 3.5. represents a separate path analysis between Canadians and South Koreans.

Table 3.5. The path analysis and bootstrapping results (separate cultural groups)

Canadian sample	ß	t	Sig.	f^2
performance expect -> BI	-.024	.217	.828	.000
effort expect -> BI	-.161	2.044	.041	.024
social influence -> BI	-.026	.361	.718	.001
facilitating condition -> BI	.199	2.268	.023	.024
hedonic -> BI	.095	1.094	.274	.007
price -> BI	.036	.439	.661	.001
habit -> BI	.252	2.84	.005	.043
safety expect -> BI	.400	4.423	.000	.102
BI -> use_pre	.405	6.014	.000	.196
BI -> use_during	.411	6.677	.000	.203
BI -> use_post	.285	4.012	.000	.088
South Korean sample	ß	t	Sig.	f^2
performance expect -> BI	.247	2.981	.003	.050
effort expect -> BI	.024	.340	.734	.000
social influence -> BI	-.032	.451	.652	.001
facilitating condition -> BI	.156	1.919	.055	.017
hedonic -> BI	.104	1.341	.180	.008
price -> BI	-.085	1.189	.235	.006
habit -> BI	.070	.982	.326	.004
safety expect -> BI	.411	5.329	.000	.146
BI -> use_pre	.550	11.354	.000	.434
BI -> use_during	.559	11.327	.000	.455
BI -> use_post	.450	7.737	.000	.254

The performance expectancy's effect on behavioral intention was only positively significant among South Koreans, whereas the effort expectancy was negatively significant only among Canadians. Performance expectancy was positively significant and effort expectancy was non-significant in the overall sample. The positive impact of the facilitating condition and the habit was only significant among Canadians.

In conclusion, hypotheses H12 through H27 (moderations) were not statistically supported. However, in the case of the moderation of cultures, different characteristics of path coefficients can be compared between the groups. Table 3.6. depicts the significance of the paths for the overall sample and separated groups.

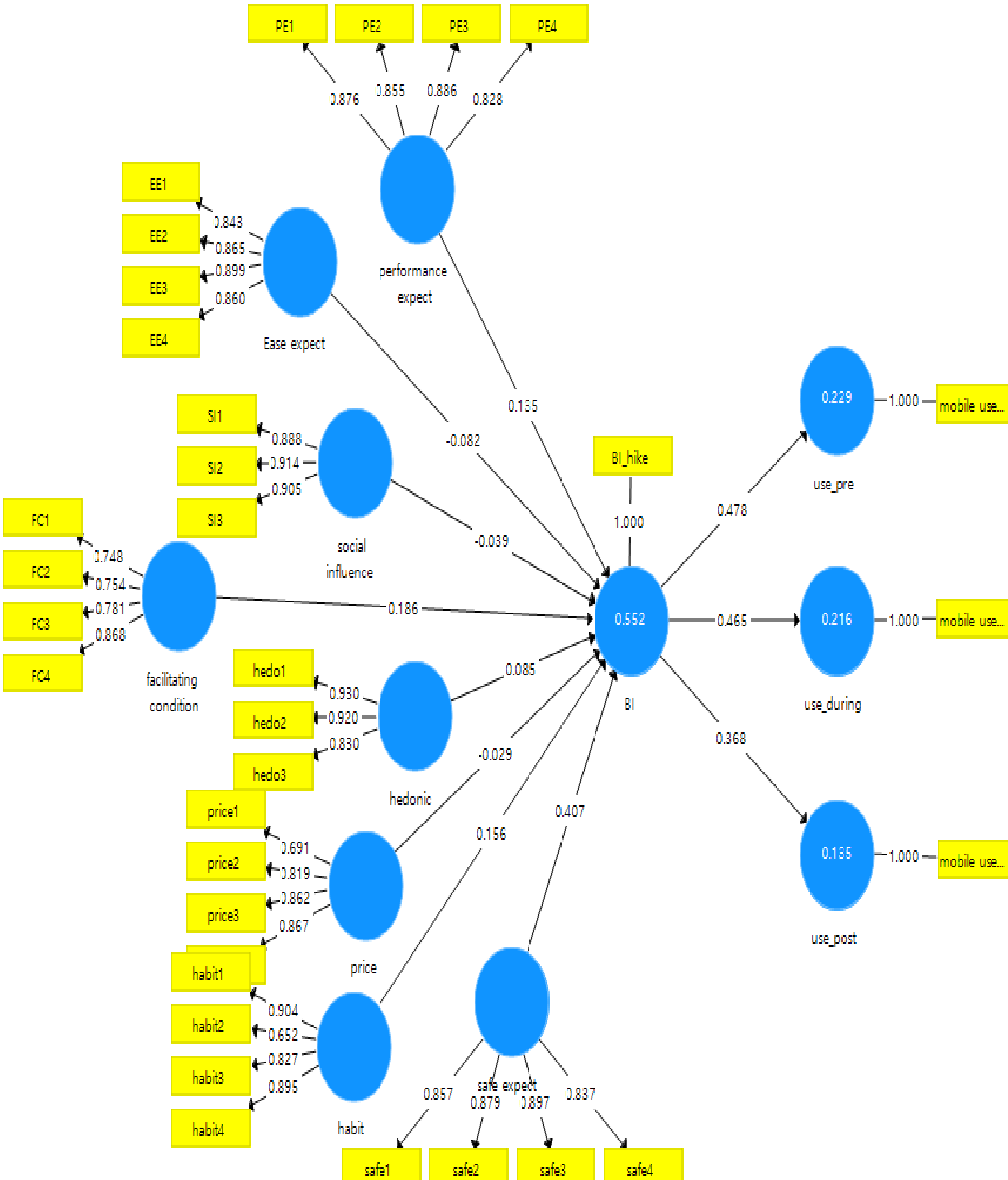
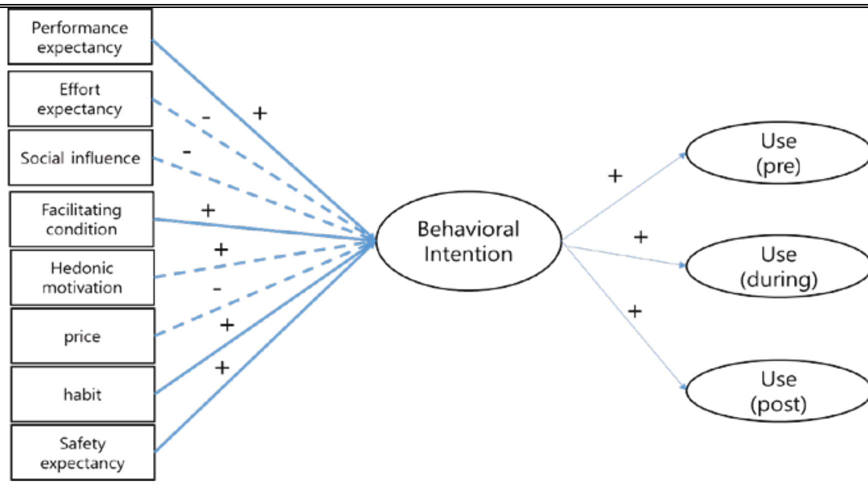


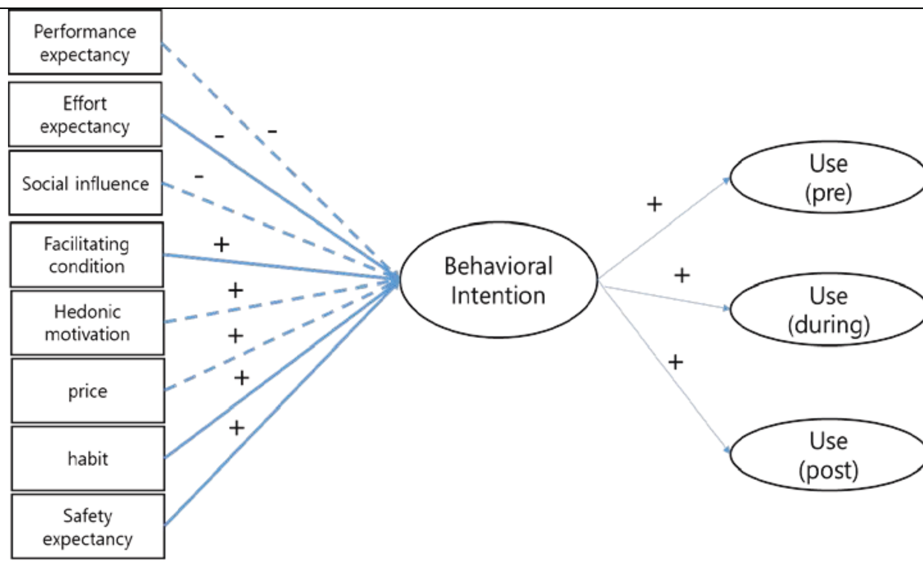
Figure 3.3. PLS-SEM model path analysis results

Table 3.6. The paths significance image for overall and cultural separation

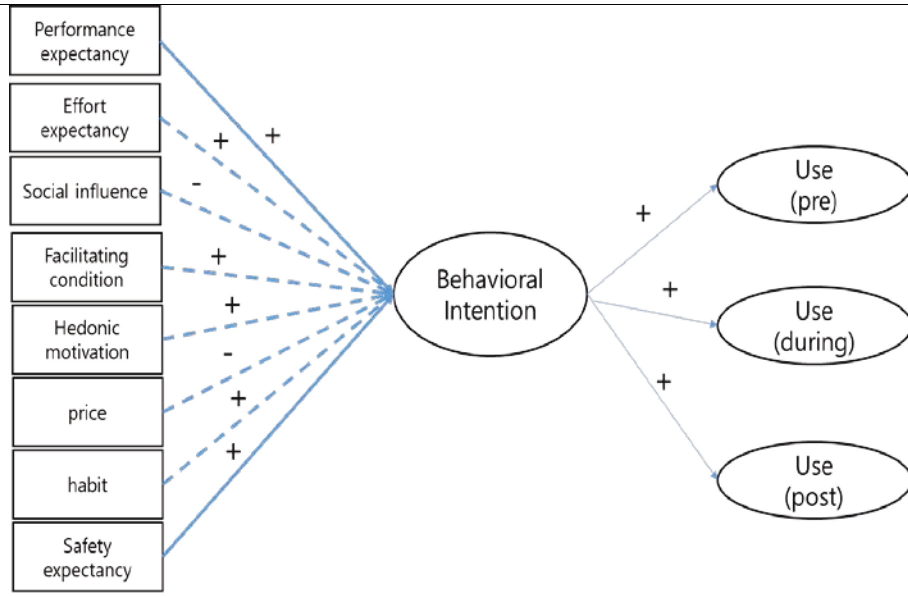
The path significance of overall sample



The path significance of Canadian sample



The path significance of S. Korean sample



DISCUSSION AND CONCLUSION

The purpose of this study was to examine the UTAUT2 model for using mobile devices such as smartphones in a hiking activity context. In doing so, the UTAUT2 model was extended with new constructs to provide a better explanation of mobile ICT use in outdoor recreation contexts including regarding the safety expectation and the three separate stages of the actual use of mobile devices. The culture (Canadian and South Korean) of participants, in addition to their age and gender factors, was introduced in the model to examine moderation effect.

Theoretical implications

The explanation power of the endogenous variables, including behavioral intention and the three stages of the use of mobile devices, was verified ranging from small to moderate levels. Therefore, the model specification and its predictive capability was supported. The effect sizes of the path relationships, however, were mostly disappointing except for the few paths with appropriate small to moderate-large effect sizes.

In terms of path coefficients and their significance, the four extended UTAUT2 constructs' impacts on behavioral intention were significant, which were performance expectancy, facilitating conditions, habit, and safety expectation. The paths from behavioral intention towards the three different stages of mobile use were also significant. The antecedent construct that had the strongest impact on the intention to use mobile devices for hiking was safety expectancy, which was the newly extended construct for the purpose of this study. The fact that the newly added variable in extension of the UTAUT2 model turned out to be the most capable predictor further illustrates the effectiveness of this study's model. In fact, the R-square of the model decreases 6% without the safety expectation construct. This finding should be highlighted as the biggest contribution to the UTAUT2 literature from this study.

The safety expectancy construct was extended in this study for understanding how people believe that mobile device assists with their mountain hiking trips such as emergency calling, GPS location tracking and navigation, checking real-time weather forecasts, and accessing various types of information regarding safety (e.g. sunset time, emergency treatment, etc.). Research by She et al. (2019) on hiking risk perception found that the number one concern for the hikers in that study was sudden bad weather, followed by other risks such as public security problems, medical assistance availability, falling accidents and injuries. The risks of hiking accidents and injuries have been one of the crucial concerns among national parks in the U.S. as well (Rickard, 2012). Previous studies have been calling for research that discusses ways to reduce these safety concerns and presents the actual serious accident rates (Bettini & Mascetti, 2016; Boller et al., 2010; Darcy, 2016; Sharp, 2001). A recent study by Warner et al. (2020) explored mountaineers' intention to use smartphones through TPB constructs, and they interpreted from their findings that mountaineers' reliance on the communication functions of their smartphones may be strongly connected to their different perspectives on safety issues in outdoor recreation. In addition to the previous studies mentioned, this study contributes to the idea that most hikers believe that their mobile devices (e.g. smartphones) are helpful tools for individual safety management in relation to the hiking activities.

The facilitating condition was the second strongest UTAUT2 construct affecting behavioral intention in this study. Facilitating condition has often been confirmed to have a positive effect on behavioral intention throughout the previous UTAUT and UTAUT2 studies (Chang, 2013; Cohen, Bancilhon, & Jones, 2013; Kranthi & Ahmed, 2018; Nassuora, 2012; T. Teo, 2011) although it is not considered to be as strong a predictor as performance expectancy or social influence constructs (Williams et al., 2015). A thoughtful approach is required in interpreting UTAUT and its extended models in discussing the trend of paths because there is a wide variety of topics and research fields that employ the models and a correspondingly wide variety of outcomes (Venkatesh, Thong, & Xu, 2016). In the case of this study, aspects such as whether or not hikers believe that they have enough connectivity (e.g. 3G, 4G, Wi-Fi), battery life, and knowledge and familiarity with their devices impacts their decision to use their mobile devices for their hiking activities more than other more popular aspects of the UTAUT2. This outcome can be explained by the specifics of outdoor recreation in mountain areas where the resources for using mobile devices are more likely perceived to be scarce compared to those in urban areas (Warner et al., 2020). Therefore, hikers consider their capabilities and availability to use the devices in mountain areas prior to worrying about the effectiveness of the technology. Another explanation could be related to the safety expectancy construct mentioned above. A mobile device's battery life or service connectivity in mountain areas could easily affect a hiker's communication capability, which results in a safety implication (Boller et al., 2010; Sharp, 2001). This may be a key explanation in understanding why the safety expectation and the facilitating condition are the strongest two constructs affecting use intention in this study.

The habit construct, although its effect size was slightly lower than the recommended small effect criterion threshold, showed a significant effect on behavioral intention following the facilitating condition. The habit construct has been a fairly strong predictor when included in the UTAUT2 studies (Herrero & San

Martín, 2017; Lai, 2015; Tamilmani, Rana, & Dwivedi, 2018; Van Winkle et al., 2019). Similar to the facilitating condition, an interpretation considering specifics of this study is required. The hikers' use of mobile devices for hiking in this study could be attributed to a spillover from the everyday use of smartphones rather than serving a particular functional purpose or as a result of addictive reasons or pressure to use the technology. The fact that 97.5% of the participants used smartphones for their hiking activities and that the outer loadings and weights of the items regarding addictiveness and feeling pressure were lower than those of items regarding habitual/casual aspects supports the explanation. This interpretation is similar and aligned with the findings, and responds to the call for further leisure-context studies in Van Winkle et al. (2019). For the purpose of extending the model specification, the habit construct was hypothesized as related to behavioral intention in this study. However, the interpretation via spillover effect from everyday smartphone use and the fact that the effect size of the path relationship was slightly short of achieving adequate small size effect may suggest that the habit construct is more suitable to be hypothesized directly with actual use as Venkatesh et al. (2012) specified.

Performance expectancy is one of the most often cited and well-predicting constructs among the UTAUT2 variables in general (Tamilmani et al., 2018; Williams et al., 2015). The path in this study also had a significant coefficient indicating that the hikers found their mobile devices useful and helpful in making hiking activity more efficient (Ain, Kaur, & Waheed, 2016; Venkatesh et al., 2003; Venkatesh et al., 2012). However, the path's effect size did not converge properly (f-square = .012). A possible explanation for the low effect size of the relationship may be related to the two strongest path relationships from the safety expectancy and the facilitating condition. The explanation variance of usefulness of mobile devices in a hiking context might have loaded into the safety expectancy construct in this study. That is, if safety expectancy was not added in the model, the hikers' beliefs regarding the usefulness of mobile devices for safety benefits would be explained mainly through the performance expectancy construct. The facilitating condition's stronger effect may be another explanation. As mentioned earlier, hikers may be more concerned with the availability of mobile devices for hiking due to the outdoor conditions of the activity prior to thinking about the usefulness of mobile devices in the mountains.

The other UTAUT2 constructs' influences were neither significant nor had a sufficient effect size. The effort expectancy did not have a significant effect. This construct has been shown to have the weakest effect explanatory performance among the four constructs in the previous UTAUT studies (Tamilmani et al., 2018; Williams et al., 2015). Since most of the participants were using smartphones for their hiking activities in this study, it could be possible that the hikers did not feel it required much effort to use their smartphones for their hiking (Van Winkle et al., 2019). Social influence also did not have a significant effect. This result indicates that the hikers do not usually take other's opinions into account on using mobile devices for hiking but that they decide based on their own values or judgements.

There are some price values implied in using mobile devices for hiking activity, such as getting a discount for transportation or accommodation purchases when these are items are bought online (San Martín & Herrero, 2012; Zhang et al., 2019), the time-saving value resulting from ubiquitous information accessibility in preparing for or during hiking activity without any extra cost. However, the mentioned values are deeply implicated as aspects of price value that may not be intuitively perceived by the users. Price values' insignificant effects in this study may be due to how participants' responses to the questions were limited only in monetary costs. The monetary valuation of using smartphones and their apps was either insignificant (e.g., the cost of the phone/connectivity serices/apps was already embedded in a nesseccity to pay for the device's use in other areas of the hiker's lives) or costs were not easily linked to hiking specific activities (Liu, Zhao, Chau, & Tang, 2015; Shaw & Sergueeva, 2019; Wang & Wang, 2010).

The hedonic value construct has been considered the most important extension of the UTAUT2 model (Tamilmani et al., 2018; Tamilmani et al., 2019) but did not show a significant impact in this study. Although important, the effect significance of hedonic value are inconsistent among UTAUT2 research (Dhiman, Arora, Dogra, & Gupta, 2019; Kaium, Bao, Alam, & Hoque, 2020; Oliveira, Thomas, Baptista, & Campos, 2016; Salgado, Tavares, & Oliveira, 2020; Yuan et al., 2015). The results of this study suggest that a possible reason for non-significant hedonic effect in this study could be that hikers either have higher safety and performance expectations of their mobile devices or are habitually using the devices. Tamilmani et al. (2019) mentioned that the hedonic construct is not a good predictor when assessing technologies with a great deal of utilitarian purpose. Although hiking activity is a beloved leisure activity, the activity itself requires more real-world context information rather than entertainment opportunities.

All three stages of use (before, during, after) were positively and significantly affected by behavioral intention as expected (Tussyadiah & Wang, 2016). The results support the conceptualizations of pre-hike use such as hotel booking and seeking access information (San Martín & Herrero, 2012; Van Winkle et al., 2019); during-hike use such as navigation, checking the weather forecast, taking pictures (Warner et al., 2020); and post-hike use such as posting hiking pictures on social media (Robertson et al., 2015; Van Winkle et al., 2019) through the theoretical model.

Cultural differences analysis was attempted but the moderation test failed to converge since no statistical difference between the Canadian and South Korean samples were found. However, the sub-group analyses were done separately between the two national groups, and their paths showed some different characteristics. The noteworthy path comparisons between the Canadian and South Korean hikers were identified for performance expectancy, effort expectancy, habit constructs, and safety expectancy.

The performance expectancy's positive effect on the behavioral intention was only significant among the South Korean hikers. The performance expectancy construct represents the practical and efficiency benefits of using a technology. Therefore, in the case of this study, the construct reflects the utilitarian value of using mobile devices in hiking, and the South Korean hikers appeared to be sensitive toward it. This result appears to coincide with the model conceptualized by Chun et al. (2012). They extended the TAM (Technology Acceptance Model) with hedonic value and conceptualized perceived usefulness as utilitarian value in order to explore whether the acceptance intention is affected by both hedonic and utilitarian dimensions. They found that Korean college students' smartphone use intentions were affected by both the hedonic and utilitarian values, but the coefficient significance was a little higher for the utilitarian dimension.

Furthermore, cultural difference analysis in the UTAUT model often conceptualizes its discussion into individualistic versus collectivist cultures and uses Hofstede's five national cultural dimensions to measure differences in cultural values (Huang, Choi, & Chengalur-Smith, 2010; Nistor et al., 2014; Sun & Zhang, 2006). According to Hofstede's dimensions, Canadian culture should value practical aspects of mobile devices more than South Koreans due to being more individualistic and more of a masculine country in general. Instead, this study yielded results that suggested otherwise. This contradiction may have emerged because of South Korea's specialized development in the ICT industry (Craven, 2019; Smith, 2016). That is, South Koreans may have higher expectations in mobile device functionality relative to many other populations.

The effort expectancy's path was only significant among Canadian hikers, but in a negative direction. This negative path direction is reversed from what was hypothesized, and this reversed path has rarely occurred in previous UTAUT studies. Exceptionally, Lin and Anol (2008) found the effort expectancy's negative effect on network IT use intention, and they explained the relationship by how an increase in the experience of technology decreases the effect of the effort expectancy. Thus, in this study's case, the negative path from the effort expectancy in the Canadian sample would make more sense when interpreted as a disconnected relationship due to the hikers' extremely high level of familiarity with their mobile devices, which were mainly smartphones.

Habit value's path was positively significant, with a small effect size, only among the Canadian hikers. On the other hand, the path relationship's effect size was close to zero among the South Korean sample. One possible explanation could be related to South Korean culture being relatively interdependent and collectivistic compared to characteristics of Canadian culture (Hofstede, 2011; Markus & Kitayama, 1991). Due to these cultural characteristics, South Koreans are usually more sensitive to social norms, which is a quality that may have caused the South Korean participants to answer the habit items that were involved with addiction aspects in lower values. In fact, the outer loading of the items "I am addicted to using my mobile device for hiking" and "I must use my mobile device for hiking" were higher for the South Korean sample than the Canadian sample, whereas the other two items of the habit value reflected more routine aspects of ICT use and were at a similar level for both two national groups.

On the other hand, the safety expectancy construct was strong and significant across both national groups. This result is consistent with the structural model analysis from the overall sample. The consistent outcomes across the cultures confirm the strongest impact of safety expectancy among the UTAUT2 in outdoor recreation contexts.

Limitations

There are limitations to this study that should be addressed. First, the participant samples from two different countries may be characterized by some important differences. Although the sampling method and survey procedures attempted were designed to be the same, inevitable circumstantial differences occurred (e.g. location, altitude, weather, daylight duration, seasons, etc.). There may be bias existing in the outcome of this study due to, for example, the mean age difference between the two national groups, which was a difference of almost 10 years. The age difference in the sample could yield some degree of bias in the result, especially with regard to technology acceptance research.

Second, the measurement questions of the UTAUT2 constructs were asked in the context of using mobile devices for participants' hiking activities that included preparation and post-use stages. However, despite the intention behind the measurement items and the effort to specify the intention in the questionnaires, it is possible that some participants may have responded to items about their mobile device use in general or while only thinking only about during-hike use without paying attention to the questionnaire's instructions.

Practical implication

The practical implication of this study's important finding can be discussed from two different perspectives. The first perspective is that of hikers. As indicated in this study's findings, mobile devices such as smartphones are expected to increase the perceived safety for hiking activities, and hikers appear to rely on them. Consequently, hikers can better predict and plan their hiking trips while considering various safety issues and judgements one may have to deal with and lift off any psychological barriers there might be. This would also help expand hikers' positive experiences in the activity as it may extend hiking options that they might not have tried if the risks were completely unknown (Shultis, 2012; Shultis, 2015).

On the other hand, the second perspective is that of park management, specifically their mandate to address risk management (e.g. mountain rescue). Martin and colleagues (Martin, 2017; Martin & Pope, 2011; Martin & Blackwell, 2016) have argued that technology's role of increasing perceived safety among mountaineers is a potential problem from the perspective of park management. That is, inexperienced hikers may engage in riskier behavior in the mountains and wilderness due to the false sense of security that mobile devices provide, resulting in accident and rescue call increases (Shultis, 2012; Shultis, 2015). Parks managers may need to educate hikers about this potential downside of their mobile devices. For instance, since social media channels are one of the effective platforms that park visitors gather information from, park managers may want to craft pre-emptive, strategic messages about their parks' attractions to promote or control visitor population and even safety by providing real time information on trail conditions and potential hazards. Additionally, park managers can collaborate with trail navigation app providers such as Trailforks or AllTrails to update critical information and instructions regarding safety issue, rather than operating managements' own platform that hikers are hardly aware of.

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Chapter 4

THE ROLE OF MOBILE DEVICES IN LEISURE CONSTRAINTS NEGOTIATION AMONG MOUNTAIN HIKERS: INTEGRATING UTAUT2 AND CONSTRAINT-EFFECTS-MITIGATION MODELS

INTRODUCTION

As scientific attention increases regarding the impact of information and communication technology (ICT) on people's everyday lives and on their behavior, studies focused on mobile phone and leisure mobility have also expanded (Kwan, 2007; Mokhtarian, Salomon, & Handy, 2006; Schwanen & Kwan, 2008). In alignment with a broad consensus on ICT's capability of lifting space-time constraints, Mokhtarian et al. (2006) suggest four types of impacts on ICT with regard to leisure: (a) the replacement of traditional leisure activities with ICT-based counterparts and (b) the generation of new ICT activities types of ICT's impact on leisure are the means of replacing and displacing traditional leisure activities with new ICT-based activities. On the other hand, (c) ICT-enabled reallocation of time to other activities and (d) ICT as enabler/facilitator/modifier of leisure activities are a means of using ICT as an instrument that affects people's everyday lives and leisure activities, which may even play a role in facilitating traditional leisure activities.

Mokhtarian et al. (2006) elaborated that some types of traditional leisure activities are easily replaced by new ICT-based activities, whereas other types of leisure activities are difficult to replace by ICT. For instance, some of the time-dependent and location-dependent leisure activities such as store shopping, watching movies, and playing in-person games are now easily being replaced by highly time-independent and location-independent new activities such as online shopping, watching Netflix, and playing online computer games. On the other hand, highly location-specific outdoor activities such as mountain hiking and camping, and highly time-specific activities such as visiting family for the holidays are difficult to replace by new ICT activities. Those activities that are difficult to replace with new ICT activities can certainly be assisted by ICT instead. For instance, using ICT as a tool to efficiently take care of other matters in life in order to make the time available for leisure or to search for information about effective ways to visit leisure destinations such as mountains is possible in these dimensional activities.

The ICT-leisure relationship described by Mokhtarian et al. (2006), (d) *ICT as enabler/facilitator/modifier of leisure activities,* will provide a focus for this study. Smartphones and apps allow more impulsive leisure activity engagement and more access to a variety of available information about leisure activity no matter the time and place. ICT also offers more price options within a limited budget for travel and activities. More importantly, ICT could potentially result in more engagement in outdoor activities and/or a greater choice of activities than was previously available (Mokhtarian et al., 2006).

There have been a number of studies done by leisure researchers about technology in similar outdoor settings (Berger & Greenspan, 2008; Foley, Holzman, & Wearing, 2007; Haldrup & Larsen, 2006; Van Winkle, Bueddefeld, MacKay, & Halpenny, 2017; Van Winkle, Cairns, MacKay, & Halpenny, 2016). However, these studies have not focused on either nature-based outdoor recreation or on mobile technology in particular. Rather, their topics are more closely related to tourism settings and technology as a whole instead of outdoor nature settings and the specific use of mobile devices. Although outdoor recreation within tourism settings includes mountain visits, outdoor settings such as visiting festivals or urban parks can be distinct from those characterized by mountain outdoor recreation (Bettini & Mascetti, 2016). For instance, festivals patrons attending a festival in an urban park setting usually have uninterrupted cellular service, and at larger festivals has Wi-Fi and charging stations provided by the festival organizers. This can be rare in some mountain parks, with the exception of ICT connectivity provided at visitor centers.

Furthermore, even the context and definition of "technology in outdoor recreation" varies across categories. The qualitative study by Shultis (2015) on the impact of technology on outdoor recreationists' wilderness experiences found an interesting trend among participants. Most of the participants who Shultis interviewed did not realize that almost all of their equipment and clothing were forms of technology until they were asked questions such as, "What outdoor recreation equipment would you consider not to be technology?'" In other words, people unconsciously and instantly think of digital, information communication technology when they hear the term "technology." It is the latter, ICT that that this study focuses on, as there is a lack of scientific literature regarding information and communication technology (e.g., smartphone) use in mountain outdoor recreation specific. This study examines mobile device use and its adoption in a mountain hiking context.

There have been issues with using mobile devices in outdoor recreation settings, mostly because of the appreciation of nature that characterizes outdoor recreation. Martin (2017) mentioned that mobile devices and applications such as lightweight GPS units, smartphones, satellite-based personal locator beacons (PLB), drones, Google Earth, Google Trekker and so on significantly changed the nature of modern outdoor recreation in both positive and negative ways. The positive aspects of using ICT in outdoor recreation are, for example, letting people feel safer and more comfortable, leading people to willingly experience places they otherwise might not try, and providing easier access to information regarding outdoor activities, and so on. On the other hand, there are negative aspects such as self-reliance replaced by technological reliance that could lead to psychological distance from nature and concerns related to less experienced visitors relying more on technology in order to compensate for their lack of knowledge or skills (Dickson, 2004; Martin, 2017; Martin & Pope, 2011).

LITERATURE REVIEW

Although examining mountain outdoor recreation and the use of mobile devices in particular is not yet a topic that has been popularized in the literature, there are studies on related topics that are scattered throughout various fields of research. For instance, fields that are particularly interested in ICT, such as computer science or human computer interaction (HCI), do occasionally research ICT use in outdoor recreation settings. Leisure researchers who are particularly interested in mountain activities and wilderness experiences have investigated how digital mobile devices can impact nature-based leisure activities. Also, there are researchers in the education field who want to encourage children and youth to participate more in outdoor activities and nature, and who believe that ICT could be an effective motivational tool for young people to go outside and into nature. In sum, there are roughly three bodies of literature regarding the topic of ICT use in nature outdoor recreation, each representing a different perspective.

Outdoor recreation research from computer science fields

The first body of literature is from HCI researchers, who are fundamentally computer scientists and computer software designers. Among the computer scientists, there are researchers who are particularly interested in outdoor recreation activities, and they are the ones who have completed studies on mobile device use in outdoor recreation settings. These studies vary from applications in outdoor sports in general

(Ahtinen et al., 2008), to hiking (Kim, Zabihi, Kim, & Lee, 2017; Posti, Schöning, & Häkkilä, 2014; Sarjakoski et al., 2012; Voda, Moldovan, Torpan, & Henning, 2014) and climbing (Kajastila, Holsti, & Hämäläinen, 2016; Kosmalla, Daiber, & Krüger, 2015). Ahtinen et al. (2008) examined the role of sport tracking applications such as GPS in the context of supporting tracking outdoor sport activities, and found that participants were highly interested in tracking outdoor sports with their mobile phones. Kim et al. (2017) proposed a crowd-sensing system that could sense risky conditions of mountain trails through data collected from hikers' smartphones that would be shared with the public. Sarjakoski et al. (2012) investigated what type of verbal instruction hikers perceived to be more comprehensive when guided by a mobile navigator, in order to propose a new and more intuitive wayfinding system for inexperienced hikers. Voda et al. (2014) proposed and examined mountain routes in the Transylvania region using GIS techniques in order to help local communities organize and manage mountaineering tourism. Posti et al. (2014) proposed a unique smartphone application: They applied the solitude concept, an most important motivation for visiting nature, to an "asocial hiking app" called the "HOBBIT." This app was designed to enable hikers to find a hiking route where there were few or no other hikers and to keep hikers updated with new routes to maintain their solitude through a smartphone's ability to pick up other smartphones' signals. The approach by Posti et al. (2014) was particularly interesting because their assumption considered the important psychological aspects of enjoying nature, whereas other researchers from the same field mostly focused on the practical aspect. Kajastila et al. (2016) and

Kosmalla et al. (2015) both focused on climbing activity in proposing either an augmented climbing wall or a wearable device that could help climbers figure out effective routes while climbing.

In sum, studies from the HCI field are based on the idea of developing and managing ICT in its purpose of assisting human activities and human interaction effectively. The underlying assumption behind their research is that computer technology such as mobile devices have a positive impact on people's lives and activities. As Jones, Daiber, Anderson, and Seppi (2017) mentioned, these researchers ask questions such as, "Does taking and sharing a selfie motivate the users and others to get outside and create experiences they deem to be worth sharing? (p.1327)" and "How can HCI researchers and practitioners understand attitudes toward interactive computing in outdoor recreation? (p.1327)" Thus, it seems safe to say that their perspective toward mobile device use in nature is relatively positive. Popular mapping and tracking technology for hiking such as Alltrails or Viewranger are in alignment with studies from the HCI field. As Daiber, Kosmalla, Wiehr, and Krüger (2017) mentioned, mountaineers are not limited to guide books or tour guides anymore because they now can access endless information online for their adventures.

Outdoor recreation and wilderness researchers' view on mobile device use in nature

The second body of literature is from outdoor recreation researchers who are especially interested in wilderness. Most wilderness research focuses on the negative effects of using digital technology in wilderness recreation although some positive effects, such as easier access, safety, and comfort, are often reported (Shultis, 2012). Wilderness research often reports that mobile technologies have altered the essence of the wilderness experience (Ewert & Shultis, 1999; J. Shultis, 2001; Shultis, 2015; Stankey, 2000), and cell phones, GPS (global positioning system), and PLB (Personal Locator Beacon) are simultaneously labeled as trouble-inducing and experience enhancing by wilderness managers (Borrie, 1998; Dickson, 2004; Roggenbuck, 2000).

Borrie (1998) mentioned how technology changes expectations of the wilderness experience with regard to increasing the desire to explore further and see more deeply into the wilderness. He was concerned that technology might be able to let people experience a greater proportion of wilderness but that it might make people depend less on their own abilities, and being able to depend on one's own ability is an essential part of the wilderness experience. He also spoke of "loss of the unknown." By providing information and knowledge much more easily and abundantly, technology is manipulating the value of unknown and hidden aspects in the wilderness. Dickson (2004) expressed concerns about the authenticity of the technology-mediated experience in the wilderness by asking questions such as, "If the outcome is predictable, is it an adventure? (p. 48)" and, "When does more technology become too much technology? (p. 50)"

Ewert and Shultis (1999) suggested five categories of technological impacts on parks and backcountry recreation, and these were access/transportation, comfort, safety, communication, and information. The category of access and transportation includes automobiles, airplanes, ATVs, snowmobiles, jet skis, and mountain bikes, and they impact parks in terms of increased use and increased types of users, recreation conflicts, and wildlife interactions. The issues that arose in this category were managers' obligations to deal with increasing conflicts, environmental impacts, infrastructure development, and so on. The comfort category includes high-tech fabrics, lightweight tents, and other factors that enhance comfort and, as a result, may cause longer visits, expanded types of users, and an increased desire for facilities. Hence, managers may have to respond to more search and rescues, and deal with visitor demands for such facilities. The safety category also includes high-tech fabrics and stronger materials for protection, which may also facilitate longer and more remote visitation. This issue concerns managers in terms of recreationists taking higher risks incongruent with their skill levels, which may potentially lead to an increase in search and rescue incidents. The communication category includes radio, cell phones, GPS devices, smartphones, and so on. These devices let mountaineers stay connected to the outside world regardless of whether they choose to or not. The implications of this category are complex. That is, staying connected in the wilderness may increase safety and planning capability but also may cause an abuse of search and rescue demand at the same time. Lastly, the information category includes sources such as television, satellite TV, and, today, mostly the internet. When the public is more informed, there are increases in awareness, use, appreciation, options, and opportunities. As much as some of their categories overlap and some of the impacts on parks management are somewhat inconsequential and inevitable, the categorization illuminates some potential problems.

Roggenbuck (2000) asked fundamental questions regarding how wilderness experiences and perceptions today are different from those of the past. Offering the specific example of how the public tends to prioritize visiting Disney World over Yellowstone National Park, he raised the question, “Should the market define nature?” (Roggenbuck, 2000, p.16). Furthermore, he also asked whether or not the “new nature” that is cleaner, safer, and more comfortable should be the future for wilderness visitors. ICT may play a role in providing this “cleaner, safer, and more comfortable wilderness.”

Wiley (1995) suggested four primary concerns regarding using mobile technology in the wilderness: (a) risk versus security, (b) solitude versus connectivity, (c) mediation versus direct experience, and (d) knowledge versus the unknown. Although these concerns and questions are often raised in the relevant literature, they have not been answered properly with empirical studies. The studies from Martin and colleagues (Martin & Blackwell, 2016; Martin & Pope, 2012; Pope & Martin, 2011) are among the very few empirical research studies on the topic. Pope and Martin (2011) examined wilderness recreationists’ attitudes toward using mobile technology in the wilderness among 235 overnight visitors to the King Range Wilderness. They found that 55% of the sample could be identified as “pro-technology” and 45% of the sample could be identified as “anti-technology.” The pro-technology group was more likely to feel that technology increased their safety and believed more than their counterparts that technology could substitute for skill, experience, and knowledge. Also, the pro-technology group responded that they were more likely to take risks when they had technology with them in the wilderness than the anti-technology group. The study by Martin and colleagues mainly focused on the “risk versus security” issue that was among the four primary concerns of Wiley (1995), and this issue has also appeared to be the primary concern for managers of parks and wilderness, according to Shultis (2015).

The debate around using technology in outdoor recreation and wilderness contexts may be divided experienced and purist outdoor recreationist who are more conservative about the meaning of being in nature against less experienced and pragmatists who value practicality and safety more (Pope & Martin, 2011; Shultis, 2012). This study tested this assumption by analyzing moderation of hiking experience level.

Outdoor education meets mobile technology

The third body of literature is from outdoor education researchers who are interested in promoting more outdoor participation and interaction with nature among children and youth. The literature from this field is more balanced with regard to integrating technology into nature than the other two bodies of literature described above. Some outdoor education studies have pointed out a serious disconnection between children and the environment due to developed technologies (Anderson et al., 2015; Charles, 2009; Hillier, 2008). For example, Hillier (2008) explained how new technologies offer children and youth many more entertainment options that involve indoor and sedentary activities, which increases their sedentary behavior and causes them to consume digital media for roughly four hours a day. Also, related literature suggests that less time with technology, along with being in nature and spending time outside, can have a positive impact on children's health (Anderson et al., 2015).

However, although environmental education and computer technology have traditionally been considered foes, outdoor education literature is increasingly looking at the positive side of integrating technology into place-based environmental education (Crawford, Holder, & O'Connor, 2017; Ruchter, Klar, & Geiger, 2010; Uzunboylu, Cavus, & Ercag, 2009; Zimmerman & Land, 2014), for example, through using mobile technology in the outdoor education of children and youth (Chang et al., 2012; Peffer, Bodzin, & Smith, 2013; Vrasidas, Zembylas, Evagorou, Avraamidou, & Aravi, 2007). More educators are now bringing technology into the classroom as they realize that younger generations are more adaptive and familiar with digital technology than ever before (Crawford et al., 2017; de-Marcos et al., 2010; Lam & Tong, 2012). These educators have implemented digital technology as a tool for children's outdoor education. Anderson et al. (2015) examined how learning outcomes show differences between a traditional approach with only pen/paper and using mobile devices combined with the traditional approach. Their results indicated that the students who were assigned to traditional-plus (with mobile devices) showed higher performance scores. They also conducted a qualitative observation of the students that showed that using technology encouraged the participants' enthusiasm and desire to share their experience with others. This outcome regarding engagement and enthusiasm was also supported by Chang, Chen, and Hsu (2011) and Chang et al. (2012) in their applications of the use of technology to field-based education as well. Hwang and Wu (2014) did a literature review study on mobile technology enhanced learning that indicated that around 83% of studies from 2008 to 2012 showed positive effects of this approach on learning achievement. The result also suggests that around 77% of the related studies showed mobile technology's positive effects on students' learning motivation. Chen, Lai, Yang, San Liang, and Chan (2008) found that although some features of personal digital assistance (PDA) did not support students' engagement in outdoor experiential learning, the class with PDA devices gained and created more knowledge than the class without PDAs. Overall, their study indicated both positive and negative sides of using PDA, which reflects the differing perspectives of the outdoor education research field on digital technology.

As found in the review of the results of the studies above, most of the studies from the outdoor education field regarding the use of digital technology focus on its performance in supporting learning ability and knowledge improvement. Yet of course, the most obvious fundamental purpose of these studies is based on the idea of being outside in the outdoors and the nature benefit to children and youth by increasing both physical and psychological health (Crawford et al., 2017; McCurdy, Winterbottom, Mehta, & Roberts, 2010; Roemmich et al., 2006; Stone & Faulkner, 2014). These studies place further emphasis on the idea of children becoming interested in protecting nature and fostering their valuing of nature when children spend more time in nature when growing up, preferably voluntarily (Cheng & Monroe, 2012; Collado & Corraliza, 2015; Collado, Staats, & Corraliza, 2013; Crawford et al., 2017).

According to Larson, Green, and Cordell (2011), 65% of youth are using digital devices outside, and it is now general knowledge that digital mobile technology is the fastest growing industry. Increasingly, researchers and educators from the outdoor education field are becoming aware of this inevitable "generational shift" (Crawford et al., 2017, p. 961) and are trying to take it account as a contributing factor to figure out the optimal way of educating through environmental experience and promoting health among children and youth. However, in comparison to the outdoor education field, there is a serious lack of empirical studies that try to understand adult outdoor recreationists' use and experiences of digital or mobile technology.

The bridge

The findings of Walker and Virden (2005) regarding leisure constraints on outdoor recreation indicated that outdoor recreation in the North American region was mostly constrained by a lack of information, crowding, the distance to the recreation area, family commitments, expense and a lack of companion, fear of crime, lack of equipment, high admission fees, and poorly maintained facilities and equipment (Shores, Scott, & Floyd, 2007). A study by Mowen, Payne, and Scott (2005) on park visitation from 1991 to 2001 also found that, most of all, park visitors needed more information in order to reduce constraints, indicating that lack of information is one of the top leisure constraints. Similar observations about the importance of information access were made by McBain (2007) who examined the factors that affect recent Canadian immigrant's visitation to national parks. If lack of information is what appears to be leading constraint for park visitation, ICT most certainly can be the most effective solution. This is because by its definition, ICT allows people to access any information on the internet from nearly anywhere.

In his study on constraints and negotiation in outdoor recreation, White (2008) suggested that greater motivation to participate in outdoor recreation would facilitate the user's negotiation strategies and resources to overcome constraints. Loucks-Atkinson and Mannell (2007) also suggested that constraints are encountered through the use of personal and social resources as negotiation strategies. Extended from their ideas, the concept of a "resource" as mentioned can be a smartphone or the apps that people currently use frequently, or at least these can be tools for "resources" when people are facing constraints. In addition, Wang, Park, and Fesenmaier (2012) wrote, "Smartphones can mediate both the behavioral and psychological dimensions of the touristic experience by facilitating information search, information processing, and information sharing, by enabling a traveler to learn about new travel opportunities and to get to know better a destination, and by sharing photos and other 'social' activities at any time during the trip" (p.371). This quote directly describes the logic of the research model in this study that was applied to outdoor recreation settings.

Chun, Lee, and Lee (2017) applied the leisure negotiation variable to the Technology Acceptance Model (TAM) to examine sport online to offline (O2O) platform acceptance among leisure sport participants. The results indicated that the negotiation factors positively influence perceived ease of use and perceived usefulness, and that they also indirectly influence behavioral intention to adapt the sport O2O platform. This study was initiated by the idea that the intention to use certain ICT for the purpose of leisure activity participation are related in a certain way to leisure constraints and negotiation. The integrated model of the present study is expected to uncover some answers around the relationship of ICT's facilitating role on leisure activity participation, or more specifically, around the role of using mobile devices in mountain hiking activities.

Leisure constraints and constraints negotiation

Leisure constraints, which can be defined as barriers that limit a person's leisure preferences, leisure participation, and enjoyment in leisure (Jackson, 2000), has been traditionally categorized into three types: intrapersonal (e.g., personality, lack of interests, fear), interpersonal (e.g., lack of companion, disparity in preference among family members), and structural (e.g., lack of time, money, and/or facilities) (Godbey, Crawford, & Shen, 2010). However, some of the recent constraints research argues that leisure constraints should be categorized into more diverse dimensions to be captured better (Casper, Bocarro, Kanters, & Floyd, 2011; Ito, Kono, & Walker, 2018; Jackson & Rucks, 1995). Hubbard and Mannell (2001) and Casper et al. (2010) indicated that the measurement items used to represent the three traditional constraints factors can be heterogeneous in terms of internal consistency. These observations suggest traditional categorization of leisure constrains may be too simple (Ito et al., 2018).

Concerns with constraints measures are especially prevalent in cross-cultural or non-Western studies, which argue that the traditional three-category constraints theory by Crawford, Jackson, and Godbey (1991) is more compatible to understand Westerners whereas using more diverse categorizations may be better to understand non-Westerners' leisure constraints (Dong & Chick, 2012; Kono, Ito, Walker, & Gui, 2020). Although there is lack of leisure constraints studies in non-Western contexts (Ito, Walker, & Liang, 2014), previous studies have asserted that the leisure constraints phenomenon varies across counties and cultures (Chick, Hsu, Yeh, & Hsieh, 2015; Dong & Chick, 2012; Ito et al., 2018; Kono et al., 2020; Walker, Jackson, & Deng, 2007). For instance, Dong and Chick (2012) discovered that constraints model with eight factors (personal issues, lack of money, family issues, service quality, lack of time, transportation, stress, and lifestyle) has advantage over traditional three-factor model in understanding their Chinese-culture participants.

This is also evident in some of the constraints negotiation studies as well. Leisure constraints negotiation can be defined as a behavioral or cognitive strategies and effort to circumvent constraints to facilitate leisure participation (Jackson, Crawford, & Godbey, 1993; Schneider & Wilhelm Stanis, 2007). Despite the research effort from Ma and colleagues (Ma & Ma, 2014; Ma, Tan, & Ma, 2012) and Guo and Schneider (2015), there is lack of cross-cultural or non-Western constraints negotiation studies. However, recent leisure constraints and negotiation studies such as Kono et al. (2020) and Chun (Study 1 of this dissertation) have shown different characteristics of path relationships between Canadian and people from Eastern culture, namely Japanese and South Korean.

Despite the debate around leisure constraints theory's categorization and cultural differences, this study chose to use traditional constraints categorization (interpersonal, intrapersonal, and structural) due to following reasons and rationale. First, given that the structural model of this study involves integrating and exploring a new complicated structural model, parsimony is crucial in the model design. Three categories of leisure constraints compared to more diverse (six or seven) categories ensure parsimonious modeling. The debate around the leisure constraints' categorization hasn't favored a side yet, and in fact the traditional constraints factors (Crawford et al., 1991) are still the most widely accepted and applied. Second, the lack of internal inconsistency issue among the measurements of the leisure constraints' three sub-factors can be resolved by treating the measurements as formative specifications instead of reflective (Kono, Ito, & Loucks-Atkinson, 2018; Kyle & Jun, 2015). The formative specification of the measurement compensates for the potential weakness of the three-factor leisure constraints conceptualization.

Integrating UTAUT2 and constraint-effect-mitigation models

ICT adoption among societies and in people's personal lives is growing faster than ever. Hence, there is an increasing number of studies emerging that analyze the use and acceptance of ICT through various theories and research models. The Unified Theories of Acceptance and Use of Technology (UTAUT) model is considered to be the latest and most integrative theory (Palau-Saumell, Forgas-Coll, Sánchez-García, & Robres, 2019). Modeling analysis through UTAUT is an effective approach to understanding digital technology acceptance in real life.

The UTAUT model was first constructed with these four factors: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh, Morris, Davis, & Davis, 2003). These constructs were extracted and integrated from eight different theories and models such as the theory of reasoned action (TRA), the theory of planned behavior (TPB), social cognitive theory (SCT), the technology acceptance model (TAM), the motivational model (MM), the model of PC utilization (MPCU), innovation diffusion theory (IDT), and the combined theory of TAM/TPB (C-TPB-TAM) (Dwivedi, Rana, Chen, & Williams, 2011; Venkatesh et al., 2003). As much as the UTAUT model in its original form has been used to analyze various types of technology acceptance, it also has been applied often as a baseline platform for other theories and constructs to combine and interact. There are generally three broad ways in which the UTAUT model is extended or integrated (Venkatesh, Thong, & Xu, 2012), first of all by applying new technology, populations, and cultural settings into the UTAUT model. The UTAUT model has been mainly used to examine basic information systems such as e-government service (Al-Shafi & Weerakkody, 2010; Al-Sobhi, Weerakkody, & Al-Busaidy, 2010; Chan et al., 2010; Hung, Wang, & Chou, 2007), online banking (AbuShanab, Pearson, & Setterstrom, 2010; Wang, Wang, Lin, & Tang, 2003; YenYuen & Yeow, 2008), e-commerce (Molla & Licker, 2005; Rahayu & Day, 2015; Uzoka, 2008), the internet itself (Dasgupta & Gupta, 2010; Niehaves & Plattfaut, 2010), and so on. Furthermore, the UTAUT has been used to examine communication systems such as mobile banking (Luo, Li, Zhang, & Shim, 2010; Zhou, Lu, & Wang, 2010), mobile phones (Van Biljon & Kotzé, 2008), mobile technology (Park, Yang, & Lehto, 2007; Song & Han, 2009), and mobile commerce (Min, Ji, & Qu, 2008; Tan & Wu, 2010), along with various office systems (Curtis & Payne, 2008; Hutchison &

Bekkering, 2007; Lee, Li, Yen, & Huang, 2010). As the model became more widely adopted, specialized business systems have been studied using the UTAUT model not only in medical (Coss, 2009; Hennington & Janz, 2007; Kim, Lee, Hwang, & Yoo, 2015) and management (Pahlke & Beck, 2009; Palau-Saumell et al., 2019) professions but also in the fields of tourism (Gupta & Dogra, 2017; Perez-Aranda, Robles, & Urbistondo, 2019; San Martín & Herrero, 2012; Zhang, Seo, & Ahn, 2019) and healthcare (Beh, Ganesan, Iranmanesh, & Foroughi, 2019; Duarte & Pinho, 2019; Yuan, Ma, Kanthawala, & Peng, 2015).

The second way in which the UTAUT model has been enhanced and applied is by adding new constructs along with the original UTAUT constructs in order to understand ICT use non-work environments. For instance, Chan, Gong, Xu, and Thong (2008) extended their UTAUT model by adding constructs such as visibility, subjective norm, and perceived cost-effectiveness to assess use and acceptance of short message service (SMS). Palau-Saumell et al. (2019) introduced a perceived credibility construct to the UTAUT2 model while reconstructing the original UTAUT2 factors such as price value and social influence in order to better assess user acceptance of mobile apps for restaurants. The UTAUT2 model was initially based on the original UTAUT model; Venkatesh et al. (2012), extended the model by adding new constructs, designed to make the model more explanatory in non-work settings -- expanding the UTAUT model's theoretical scope and generalizability.

Based on their thesis and theoretical considerations, Venkatesh et al. (2012)

added three new constructs: hedonic motivation, price value, and habit. Hedonic motivation means the perceived enjoyment or pleasure derived from using technology, which is considered to be the most significant addition to the UTAUT2 model because it represents a paradigm shift from extrinsically motivated technology use (e.g., governmental or organizational mandatory services) to intrinsically motivated technology use (e.g. individual access to technology as consumers) (Tamilmani, Rana, Prakasam, & Dwivedi, 2019; Venkatesh et al., 2012). Price value can be defined as "consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them" (Venkatesh et al., 2012, p. 161). Price value will have a positive influence when perceived benefits surpass the monetary cost of using technology (Tamilmani, Rana, Dwivedi, Sahu, & Roderick, 2018; Venkatesh et al., 2012). Lastly, the definition of a habit construct is a person's behavior that is performed automatically due to learning (Venkatesh et al., 2012). Habit also was considered to be important enough to be added as a construct of the UTAUT2 model. The habit variable was considered in the UTAUT2 for its role as a perception of readiness (Limayem, Hirt, & Cheung, 2007; Venkatesh, 2013), which was believed to be a strong predictor of using technologies such as mobile devices (Tamilmani et al., 2018). However, a review of UTAUT2 studies suggest habit is inconsistently applied by researchers, with only a 35% rate of the construct's inclusion among previous UTAUT2 studies (Tamilmani, Rana, & Dwivedi, 2018). Tamilmani et al. (2018) suggest the major reason for this is that many studies were examining use of new technologies at early stage of adoption, which did not a lot sufficient time for habits to form. The most used added UTAUT2 construct among previous studies was hedonic motivation (58%), followed by price value (41%) (Tamilmani, Rana, Dwivedi, et al., 2018; Tamilmani, Rana, & Dwivedi, 2018).

Lastly, the third way in which the UTAUT model has been extended or integrated is to add external variables into the UTAUT (Venkatesh et al., 2012). Brown, Dennis, and Venkatesh (2010) indicated that the UTAUT by itself is insufficient to produce an explanation of what leads to the adoption of a specific technology, its potential users, and the contexts of use. They suggested using UTAUT as a mediating construct in the relationship between the external factors representing the characteristics of a specific technology acceptance and a use situation. In their meta-analysis research, Dwivedi et al. (2011) identified 22 studies that used external variables along with the UTAUT out of 43 UTAUT studies they investigated. They found that the most commonly used external variables used were attitude, anxiety, trust, self-efficacy, and so on. A few years later, the literature review study by Williams, Rana, and Dwivedi (2015) on 174 UTAUT also found that there were a number of external variables being introduced into the UTAUT model. The most frequently used external variables were self-efficacy (21 occurrences), attitude (20 occurrences), and trust (18 occurrences). Additionally, other psychological concepts such as anxiety (Duyck et al., 2008), flow (Zhou, 2011), and charismatic leadership (Neufeld, Dong, & Higgins, 2007) have been used as external variables as well. This third approach to extending the UTAUT model informs the justification of this current study's objective, which is to extend and integrate the UTAUT2 model with the constraints-negotiation model to expand understanding the acceptance of mobile technology in the mountain hiking experience.

There are also moderators that are theorized to affect constructs within the UTAUT and UTAUT2 models. Moderating variables such as age, gender, and experience were suggested by Venketash and colleagues in their original model (Venkatesh et al., 2003; Venkatesh et al., 2012). However, systematic review studies on UTAUT revealed that the previous research rarely include moderating variables in the model (Venkatesh, Thong, & Xu, 2016; Williams et al., 2015). Due to a lack of UTAUT and UTAUT2 studies that appeared to include moderators, systematic review or meta-analysis studies often have chosen to omit moderators in their equations and tried to suggest generalizable research models without the moderators (Tamilmani, Rana, & Dwivedi, 2020; Venkatesh et al., 2016) (Tamilmani et al., 2020; Venketesh et al., 2016). Dwivedi, Rana, Jeyaraj, Clement, and Williams (2019) and Tamilmani et al. (2020) agree that including moderators in the UTAUT theories potentially harm generalizability due to the moderators' risk that they may not be irrelevant in certain research settings. However, the review also indicated that some previous studies included their own proposed new moderators are relevant to their research topics such as cultures (Al-Gahtani, Hubona, & Wang, 2007; Im, Hong, & Kang, 2011; Venkatesh & Zhang, 2010), ethnicity, religion, income, education (Liew, Vaithilingam, & Nair, 2014) etc. This study adopted a moderator of culture to examine differences between

Canada and South Korea.

In terms of selecting a specific model from the constraint-negotiation theory, the constraint-effect-mitigation model was chosen for the model integration of this study. In a study of employee's engagement in work-site recreation services Hubbard and Mannell (2001) compared the predictive performance of four competing models of constraints-leisure theory, including the independence model, the negotiation-buffer model, the perceived-constraint-reduction model, and the constraints-effect-mitigation model. The results suggested that the constraints-effect-mitigation model could predict the theory the most. The model suggests that (a) the constraint variable negatively affects participation while mediating the negotiation variable positively and (b) motivation positively affects participation, as highly motivated individuals will be more likely to put the effort into negotiating barriers. In contrast with Mannel and Hubbard's examination of employee's engagment in recreation services, Hung and Petrick's (2012) comparison of non-cruisers and cruising enthusiasts' intention to engage in boat cruising supported this model's characterization of variables relations, with the exception of constraints' negative prediction of negotiation – possibly due to the larger investment of resources needed to engage in boating..

Further research that has tested the constraints-effect-mitigation model has yielded somewhat inconsistent results (Jun & Kyle, 2011; Loucks-Atkinson & Mannell, 2007; Samdahl, 2005; Son, Mowen, & Kerstetter, 2008; Wilhelm Stanis, Schneider, & Russell, 2009). This has led some researchers to make alterations to the model and develop their own models, such as the constraint-negotiation dual channel model (Son et al., 2008) and the interactive effect of identity and motivation model (Son, Kerstetter, & Mowen, 2009). Previous research showed that the model can be flexible in adapting other factors and rearranging them (Moghimehfar & Halpenny, 2016; Son et al., 2009; Son et al., 2008; White, 2008; Wilhelm Stanis et al., 2009). However, the constraint-negotiation model needs future testing with various different samples, measurements, and contexts (Wilhelm Stanis et al., 2009). The most recent cross-cultural study by Kono et al. (2020) found that the most simplistic model, namely the independence model, outperformed the other competing models from Hubbard and Mannell (2001) in predictive power while Son et al.'s (2008) dual-channel model was the most comprehensive in terms of explanatory modeling. Although Kono et al.'s (2020) study adds important value on the knowledge of constraints negotiation literature, the inconsistency in the results of competing models is still at large.

White's (2008) study also tested the constraint-effect-mitigation model in the outdoor recreation context, with a research interest similar to that of this study. Their results partially supported the constraints-effect-mitigation model by using the same scale for the motivation factor (REP scale) as the present study. White's (2008) study inspired me to apply the constraints-effect-mitigation model to this study, suggesting the model predicts behavioral intentions well in outdoor recreation contexts.

Similarities and differences between Canadian and South Korean cultures

This study aimed to compare the experiences of mountain outdoor recreation participants in Canada and South Korea in the context of their use of mobile devices. Points of parities between two contexts are that both countries have abundant mountain and forest areas that allow people to pursue outdoor recreation. Both Canadians and South Koreans regard mountains positively and consider these mountain areas to be among the most popular and valuable leisure places in their countries. Seventy per cent of South Korea's territory is mountainous. Mountain hiking was one of the most popular leisure activity for South Koreans over the last decade, and one-in-three South Koreans go hiking more than once a year (Lee & Jeong, 2018). This suggests that hiking has become part of South Koreans' identity (Harlan, 2014). This love of the mountains appears to be the same for Canadians as well. Despite concerns about Westerners' decreased access to nature (Louv, 2008), outdoor activities and being close to nature are also considered important by a large segment of Canadian society. This deep appreciation of nature starts early for youth in children's camps and family vacations, and is supported by schools and universities with outdoor programs (Henderson & Potter, 2001). However, differences also exist. The countries have different park management styles. According to Shin, Jaakson, and Kim (2001) and Lee and Bürger-Arndt (2008), South Korean forest management is focused on physical resources and ecological inventories, whereas Western countries like Germany are more focused on programs with various recreation activities and environmental education. In the case of Canada, there is a major emphasis on maintaining ecological integrity while providing the opportunity for recreation activities (Dearden, Rollins, & Needham, 2016). Also, cultural differences between Eastern and Western cultures relating to hiking motivations are worth investigating (Walker, Deng, & Dieser, 2001).

In terms of ICT infrastructure, according to a travel article from *The Telegraph* of Telegraph Media Group, the 4G coverage rate in South Korea holds the top ranking in the world with 95.71%, and Canada ranks 17th with a 75.42% rate (Smith, 2016). Also, with the 4G speed rankings, South Korea holds second place, whereas Canada did not even make it into the list of the top 20 countries. Additionally, South Korea is one of the first countries to begin providing 5G services in the world, along with the United States, Germany, and the United Kingdom (Craven, 2019). Under the assumption that the difference between Canada and South Korea in mobile communication service quality may create a different experience for smartphone users, especially for activities in mountain and forest areas, this study intends to compare mountain outdoor recreation participants' experiences between the two countries with using a mobile device as an ancillary instrument.

Additionally, age is one of the factors that may have critical effect in using mobile technology. Previous studies indicated that older people use fewer functions of mobile devices (Zhou, Rau, & Salvendy, 2014), and that younger people holds certain behavioral tendency towards ICT distinct from older generations (Kubiatko, 2013). Kubiatko (2013) compared internet and ICT use behavior between millennial generation (people who born after 1980) and other older generation and discovered some differences between the age groups. This study considered age factor as a moderating variable to analyze the age differences of using ICT in hiking contexts.

RESEARCH MODEL AND HYPOTHESIS

Based on the rationales discussed above, the purpose of this study is to develop an integrated model that can examine the relationships among use and acceptance of mobile devices, hiking motivations, leisure constraints and negotiation strategies among mountain hikers. The model ascertains the degree to which mobile technology such as smartphones or tablet PCs facilitate leisure participation by assisting users. Also, group comparison between Canadians and South Koreans, and between experienced hikers and inexperienced hikers was taken into account. The research questions of this study are as follows:

1. How well does an integrated model containing the constraint-effect-mitigation model and the UTAUT2 model predict mountain hikers' participation when the use of mobile devices is incorporated into the model to investigate impacts on leisure constraints negotiation strategies?
2. Do the UTAUT2 variables and acceptance of mobile devices effectively mediate the relationship among constraints, motivation, and negotiation

in predicting mountain hiking participation?

3. Does the integrated model demonstrate that using mobile devices for mountain hiking facilitates participation as a mediating tool or path?

4. What are differences and similarities between Canadians and South Koreans in the model?

5. What are differences and similarities between highly experienced and inexperienced mountain hikers in the model?

Hypothesis:

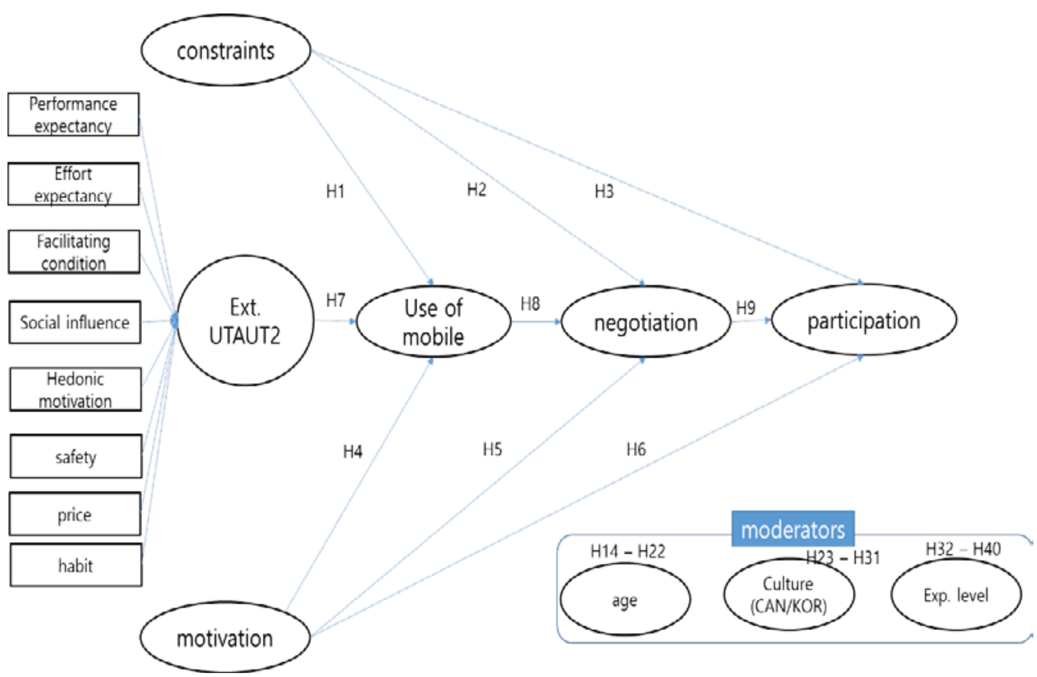


Figure 4.1. Research hypotheses

H1: Constraints will positively influence use of mobile devices.

H2: Constraints will positively influence negotiation.

H3: Constraints will negatively influence participation.

H4: Motivation will positively influence use of mobile devices.

H5: Motivation will positively influence negotiation.

H6: Motivation will positively influence participation.

H7: Extended UTAUT2 will positively influence use of mobile devices

H8: Use of mobile devices will positively influence negotiation.

H9: Negotiation will positively influence participation.

H10: Use of mobile devices will have mediation effect between constraints and negotiation.

H11: Use of mobile devices will have mediation effect between UTAUT2 and negotiation

H12: Use of mobile devices will have mediation effect between motivation and negotiation.

H13: Negotiation will have mediation effect between constraints and participation.

H14: Negotiation will have mediation effect between use of mobile device and participation.

H15: Negotiation will have mediation effect between motivation and participation.

H16 – H24: Age moderation

H25 – H33: Culture moderation

H34 – H42: Hiking experience level moderation

METHOD

Participants

The target population was Canadians and South Koreans participating in outdoor recreation, especially in mountain hiking and using trails. This study was designed to examine behavior and experiences in using mobile devices for outdoor recreation activities. The study specifically targeted populations of those aged 16 years and older who enjoy mountain hiking activities. No specific demographic, other than age group and nationality (Canadian and South Korean), were targeted. Sixteen- and seventeen-year-olds were included in the Canadian sample as they form an important mobile device user group. It is important to solicit the viewpoints of this next generation of park visitors. However, only adults aged 18 years and older were recruited for the survey in South Korea due to ethics approval issues.

Hikers and trail users among Banff and Jasper National Parks and provincial parks located east of Banff in Kananaskis Country in Canada, and Seorak and Bukhan

National Parks in South Korea were targeted for the survey. The survey in Canada took place between August 1 and October 15, 2019. The survey in South Korea were collected from July 1 to August 31, 2020. The sampling method was non-probability and convenience sampling. In order to stratify the sample, data was collected during both weekdays and weekends. While all of the people encountered by surveyors in the mid- and back-country hiking trails were asked to participate, every fifth person that surveyors encountered in the front-country, mainly at trail head parking lots, were asked to participate. The surveys took place at public locations (e.g. trail heads, parking lots, scenic lookouts, visitor centers). Approximately 200 participants from each country were needed for the final analyses. According to Hair et al. (2016), the criteria for sample size in the PLS-SEM model with ten arrows pointing at constructs and 5% of a significant level detecting small effect size was recommended as 189 samples, and the number decreases as the number of arrows decreases. The model of this study has a six higher-order components relationship, and the relevant rule of thumb (Hair et al., 2017) for the recommended sample size is 157. In order to examine the moderation effect of culture (South Korean versus Canadian), around 157 samples from each country were needed.

Efforts were made to obtain as heterogeneous sample of hikers as possible. We sampled at locations where both day and overnight hikers frequented, and a variety of hiking trails – from 1 hour easy to 8 hours+ challenging hikes were possible. We were interested in sampling hikers with a high degree of hiking experience, frequently engage in hiking and who found it easy to negotiate barriers to engage in hiking, as well as those who were characterized by low frequencies of hiking or hiking experience and may experience more constraints

The items in the questionnaire were phrased with the simplest language possible to minimize the survey's difficulty. Respondents were informed that they could choose to stop the survey at any time or skip questions that they were not comfortable with answering. Throughout the whole survey process, participants were asked to complete the questionnaire anonymously. The participants were compensated with a small token of appreciation, such as chocolate or snacks, when they completed the questionnaire.

Approximately 94% of the survey was done in situ using tablet PCs with an electronically formulated questionnaire on either Qualtrics (www.qualtrics.com) or the Google Forms. Those who agreed to respond after their hiking activity, but did not want to linger and complete the survey at site (often due to difficult weather conditions), were given the links to the online questionnaire to complete once they returned or enroute to their home. Only a small portion of the sample responded through paper-based questionnaires.

Measurement

1. Questionnaire translation

The questionnaire was formulated in English first for the Canadian survey based on the items from related previous studies (Alexandris & Carroll, 1997; Hubbard & Mannell, 2001; Loucks-Atkinson & Mannell, 2007; Venkatesh et al., 2003; Venkatesh et al., 2012; White, 2008). The questionnaire in English was translated into Korean for the South Korean survey word-for-word using both back-translation and parallel translation methods (Malhotra, Agarwal, & Peterson, 1996; McGorry, 2000), except for the item "I hike with people who share a similar ethnic background with me," due to South Korea's extremely homogeneous ethnicity. Over 96% of the South Korean population is identified as ethnically Korean (Kenneth Kimutai too, 2019). Back-translation, also known as double translation (McGorry, 2000), was done by two bilingual people. One bilingual translator translated the English questionnaire into Korean first, and then another translated the Korean translation back into English. After the back-translation, the original questionnaire in English and the outcome of the back-translation in English were compared for accordance. Some disagreements surfaced between the original items, for example with back-translated items such as "I am afraid of getting hurt while hiking" where the intensity of the Korean interpretation of the words "getting hurt" can be back translated into "injured" depending on the word choice in Korean. Also, items such as "I lack the physical ability to go hiking" and "I choose hiking routes that are appropriate to my fitness level" faced different interpretations depending on whether the Korean translation of the words "physical ability" and "fitness level" differentiated between capability/disability and health/fitness level.

The English and Korean versions of the questionnaire, along with the disagreements found in the back-translation process, were examined and discussed by the parallel translation committee formed with four English education and Korean-English translator professionals working in South Korea. The committee firstly reached consensus on the disagreements that occurred in back-translation (Malhotra et al., 1996). The degree and categorical meaning of terms such "getting hurt," "physical ability," and "fitness level" were discussed in order to choose the most suitable Korean words for the items in Korean. The committee also pointed out the Korean translation outcome from the back-translation of the word "afraid" in items such as "I am afraid of getting lost while hiking" in which the translation seems a bit inflated, and could give the impression that the original meaning suggested the word "fear" instead of "afraid." The Korean translation for the discussed items was revised. The committee members all agreed on the rest of the items' translations in Korean with some minor adjustments that were later applied to the final version of the Korean questionnaire. The questionnaire in Korean is shown in the Appendix.

2. Constraints-negotiation theory

Latent variables from the leisure constraints-negotiation structural model of Hubbard and Mannell (2001), especially based on the constraint-effect-mitigation model, were measured in this study. The constraints factor consists of three constructs: intrapersonal, interpersonal, and structural. Intrapersonal constraint was measured by six items to capture participants' psychological barriers caused by personal states while participating in hiking (White, 2008). Interpersonal constraint was measured by three items that asked participants about the availability of companions to participate in activities with and their companions' preference of leisure activity (White, 2008). Structural constraint was measured by six items to capture participants' barriers against circumstantial resources such as time, money, and transportation to participate in hiking (Alexandris & Carroll, 1997; Hubbard & Mannell, 2001; White, 2008). The three-factor constraints model was chosen for parsimony and traditionally has demonstrated superior performance over other models such as eight-factor model (Dong & Chick, 2012).

The negotiation factor consists of six constructs, which are changing leisure aspiration (4 items), improving finances (2 items), changing interpersonal relations (7 items), energy management (2 items), skill acquisition/information (4 items), and time management (3 items). The items for negotiation were mostly adapted from Loucks-Atkinson and Mannell (2007), and from Hubbard and Mannell (2001) and White (2008).

Inspired by previous motivations for outdoor recreation studies (Kim, Lee, Uysal, Kim, & Ahn, 2015; Manfredo, Driver, & Tarrant, 1996; Raadik, Cottrell, Fredman, Ritter, & Newman, 2010; Walker et al., 2001; White, 2008; Wilhelm Stanis et al., 2009), the recreation experience preference (REP) scale was adapted to measure the motivation factor in this study. Motivation was made up of five constructs: achievements, enjoy nature, escape, socialize, and health. Four items were used to access how much motivation there was to experience feelings of achievement by the participants. Enjoy nature was measured by three items to see how much purpose participants had for enjoying nature's presence and view. Escape measured how much motivation participants had from escaping everyday life, with four items. Socialize was measured by three items to capture how much motivation participants had for hiking together with others. Finally, health measured how much of a desire there was for improving both physical and psychological health, with two items. Most of the items used to measure motivation were adapted from White (2008), except for the health construct items (Manfredo et al., 1996; Wilhelm Stanis et al., 2009).

Participation was measured by the frequency and the duration of the hiking activity. The frequency question asked participants how often they hike; individuals could respond once per season, more than a season but less than once a month, more than once a month but less than once a week, and more than once a week. The duration item asked participants how long they planned to hike the day they were intercepted by the surveyor or had hiked if they had completed their hike (i.e., 1 hour or less, 1 to 3 hours, more than 3 hour day trip, and overnight trip). The responses from the hiking frequency and duration measurements were divided into four groups and multiplied with each other in order to create a measurement of overall level of hiking participation (Wilhelm Stanis et al., 2009).

3. Extended UTAUT2

The UTAUT2 model utilized in this study was referred to as the “extended” UTAUT2 model because a safety variable was added, to explore its contribution to explaining digital device use in outdoor recreation specifically. The extended UTAUT2 in this study consists of eight sub factors, which are performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price, habit, and safety expectancy. The safety expectancy construct was added to address specifics of the study context -- safety issues are an important consideration in mountain outdoor recreation (Bettini & Mascetti, 2016; Boller, Hunziker, Conedera, Elsasser, & Krebs, 2010; Logue, 2013; Musa & Thirumoorthi, 2015; Pickering, Castley, Hill, & Newsome, 2010).

Performance expectancy was measured by four items such as “My mobile device is useful for my hiking.” The effort expectancy construct was measured with four items including “My mobile device is easy to use for hiking.” Social influence was measured by two items such as “People who are important to me think that I should use my mobile device for my hiking.” Facilitating conditions was represented by four items including “I have necessary data connectivity to use my mobile device for hiking.” Hedonic value was measured by three items such as “Using my mobile device for hiking is enjoyable.” Price construct’s four measurement items included “Using my mobile device for hiking offers excellent value for my money.” Habit was documented using four items such as “Using my mobile device for hiking has become habit for me.” Finally, four items such as “Using my mobile device for hiking makes me safer" were used to measure the safety expectancy construct. Also, for parsimonious purposes, this study simplified the endogenous variable of the UTAUT2 model, by only incorporating actual use behavior and not ICT use intention (Beh et al., 2019; Jun, Park, & Cho, 2019; Keong, Ramayah, Kurnia, & Chiun, 2012; Thongsri, Shen, Bao, & Alharbi, 2018; Yuan et al., 2015). The actual use of mobile devices was measured by three stages of use, which were before, during, and after hiking activity. The overall items are shown in Table 4.1.

4. Moderating factors

Age, gender, and experience variables are not only common moderators for social science studies but also have been part of the UTAUT and UTAUT2 models since their first applications (Venkatesh et al., 2003; Venkatesh et al., 2012). However, these moderating variables are not always included in UTAUT studies, and their performance as predictors of ICT use are inconsistent. Also, previous researchers often applied moderators as they saw fit to their own study contexts (Venketesh et al., 2016). Following that approach, this study applied age, culture (Canadian and South Korean), and experience level in hiking (instead of experience in using technology) as moderating factors.

Analysis

PLS-SEM (partial least squares equation modeling) was employed to analyze the collected data. While CB-SEM is widely used for many structural modeling studies, PLS-SEM is more suitable for certain structural types and designs. For example, PLS-SEM is capable of considering both reflective and formative measurement, whereas CB-SEM only considers reflective structures (Hair, Hult, Ringle, & Sarstedt, 2016). The constraints variable in this study's integrated model consists of formative measurements with formative constructs affecting the latent variable. Variables such as negotiation, motivation, and UTAUT2 constructs' sub-factors were also treated formatively on the higher-order level but their measurements were treated as reflective.

Furthermore, PLS-SEM analysis is based on ordinary least squares (OLS) regression rather than the maximum likelihood (ML) approach and estimates path relationships that maximizes R-square values. This characteristic makes PLS-SEM the preferred method when developing theory or exploring path relationship models (Hair et al., 2016). The structural model of this study is designed to explore the path relationships of a newly extended and integrated model from two existing models. Therefore, the PLS-SEM is a more suitable approach for exploring an analysis of this study's pats relationships.

The SmartPLS 3 program was used for the analyses. First, a measurement model test was employed. For those factors with reflective items, internal consistency reliability was assessed through the calculation of composite reliability (CR), and the convergent validity was assessed with average variance extracted (AVE) values. The reliability and the convergent validity of the constructs were supported as the CR values of all the constructs were above 0.7 and the AVE values above 0.5 (Table 4.1).

Discriminant validity was tested through examining the heterotrait-monotrait ratio of correlation measures (HTMT). HTMT is the ratio between the correlation of indicators across different constructs and correlations within the same constructs (Duarte & Amaro, 2018; Henseler, Ringle, & Sarstedt, 2015). All of the HTMT ratios among the constructs yielded values under 0.9, and thus the discriminant validity of the measurements was supported (Duarte & Amaro, 2018; Gold, Malhotra, & Segars, 2001; Teo, Srivastava, & Jiang, 2008).

Formative measurements only exist in leisure constraints variables in this study. The validation for the formative measurement needs to refer to the formative structural model validation, located in the results section, because the base level formative measurements at formative-formative HCM are converted into single-level formative factors using the two-stage approach modeling at its second stage.

Collinearity issues among the formative indicators were tested for at the stage of measurement model validation (formative-formative specification at the first stage). The variance accounted for (VIF) values of all the measurements were under the threshold of 5, and all the formative indicators were even lower than the minimally required VIF value of 2 (Hair et al., 2017). Thus, it was statistically supported that the measurements were free of multicollinearity issues.

Table 4.1. Mean/Standard deviation and Confirmatory factor analysis for the reflective measurements

variables	constructs	items	M	S.D.	CR	AVE
Leisure constraints	Intrapersonal constraints	I am not interested in hiking.	1.73	.990	Formative indicators	
		I am afraid of getting hurt while hiking.	2.51	1.129		
		I am afraid of getting lost while hiking.	2.34	1.116		
		I cannot access enough information about hiking.	2.13	1.032		
		I lack of skills to go hiking.	2.32	1.068		
		I lack the physical ability to go hiking.	2.10	1.066		
	Interpersonal constraints	My companions usually prefer activities other than hiking.	3.05	1.096		
		I don't have people to go hiking with.	2.36	1.186		
		The people I know live too far away to go hiking with me.	2.35	1.161		
	Structural constraints	The fees to go hiking make it too expensive.	1.90	1.008		
		The equipment for hiking is too expensive.	2.75	1.228		
		I don't have the right equipment.	2.52	1.234		
		The place for hiking is too far away.	2.44	1.191		
		I lack transportation to hiking sites.	2.00	1.159		
		I don't have enough time for hiking.	2.80	1.177		
Participation		How long is your hike today? (duration)	2.20	.642		
		How often a year do you hike? (frequency)	2.17	.968		
Actual use of mobile device		How often to do you use your mobile device to prepare for a hiking trip?	3.23	1.240	Single	

		How often do you use your mobile device during hiking?	2.79	1.135	indicators	
		After hiking, how often do you use your mobile device to share, document and reflect on your most recent hiking trip?	3.02	1.255		
negotiation	changing leisure aspiration	I choose hiking routes that are appropriate to my fitness level	3.73	.903	.786	.552
		I sometimes change my hiking location due to trail and weather conditions.	3.96	.841		
		I try to visit my favorite hiking place when it is less crowded.	3.86	.916		
	finance	I budget my money to enable more hiking.	3.72	1.041	.764	.620
		I choose locations to hike that are less expensive.	2.64	1.108		
	changing interpersonal relations	I participate in hiking activities with people whose age is similar to mine.	3.11	1.076	.744	.503
		I hike with people with similar interests.	3.38	1.143		
		I actively look for people to hike with.	2.86	1.060		
	energy management	I get a lot of rest to prepare for hiking.	3.75	.956	.762	.623
		When hiking, I try to set the right pace for my fitness level.	3.19	1.134		
	skill acquisition/ information	I try to improve my hiking skills.	3.55	1.038	.842	.574
		I get advice from experienced hikers.	2.87	1.090		
		I seek out information about the best hiking trails.	3.10	1.039		
		I look for information on transport and access to hiking sites.	3.96	.809		
	time management	I set aside time for hiking.	3.51	1.046	.869	.689
		To ensure that I can hike, I try to plan ahead for things.	3.09	1.145		

		I get up early or stay up late to increase time for hiking.	3.62	1.129		
motivation	achievement	I go hiking to gain a sense of accomplishment.	3.47	1.136	.881	.649
		I go hiking to experience excitement/adventure	3.35	1.114		
		I go hiking to gain a sense of self-confidence.	3.59	1.085		
		I go hiking to develop my skills and abilities.	3.16	1.159		
	enjoy nature	I go hiking to be close to nature.	3.79	1.026	.910	.623
		I go hiking to observe the scenic beauty.	3.59	1.176		
		I go hiking to enjoy the sounds and smells of nature.	3.50	1.044		
	escape	I go hiking to get away from the usual demands of life.	3.27	1.125	.892	.673
		I go hiking to experience solitude.	4.21	.883		
		I go hiking to experience peace and quiet.	4.35	.790		
		I go hiking to unwind.	4.27	.854		
	social	I go hiking to be with family or friends.	4.08	.950	.864	.679
		I go hiking to be with people who share my values.	3.46	1.175		
		I go hiking to feel connected to others.	3.97	1.073		
	health	I go hiking to improve my physical fitness	3.78	1.095	.903	.824
		I go hiking to improve my mental well-being.	3.82	1.091		
UTAUT2	performance expectancy	My mobile device is useful for my hiking	3.73	1.057	.920	.743
		For hiking, my mobile device increases the chance of achieving important	3.40	1.149		

	things.				
	Using my mobile device helps accomplish things more quickly for hiking.	3.46	1.120		
	I can save time when I use my mobile device for my hiking.	3.38	1.129		
effort expectancy	Learning how to use my mobile device for my hiking is easy	3.63	1.057	.924	.753
	For hiking, my interaction with my mobile device is clear and understandable.	3.52	1.056		
	My mobile device is easy to use for hiking.	3.63	1.036		
	It is easy for me to become skillful at using my mobile device for hiking.	3.55	1.062		
social influence	People who are important to me think that I should use my mobile device for my hiking.	3.07	1.119	.929	.814
	People who influence my behavior think that I should use my mobile device for hiking.	2.95	1.095		
	People whose opinions that I value prefer that I use my mobile device for hiking.	3.06	1.070		
facilitating conditions	I have the necessary data connectivity to use my mobile device for hiking.	3.27	1.219	.870	.626
	I have a sufficient source of electric power to use my mobile device for hiking.	3.58	1.093		
	I have the knowledge necessary to use my mobile device for hiking.	3.67	1.056		
	I feel comfortable using my mobile device for hiking.	3.64	1.054		

	hedonic motivation	Using my mobile device for hiking is fun.	3.25	1.122	.923	.801
		Using my mobile device for hiking is enjoyable.	3.29	1.100		
		Using my mobile device for hiking is very entertaining.	2.80	1.134		
	price	I can save money by using my mobile device for hiking.	3.03	1.086	.887	.662
		Using my mobile device for hiking offers excellent value for my money.	3.23	1.035		
		The price of using my mobile device for my hiking is reasonable.	3.43	0.974		
		The price of using my mobile device for hiking is affordable.	3.41	1.037		
	habit	Using my mobile device for hiking has become habit for me.	3.26	1.272	.897	.688
		I am addicted to using my mobile device for hiking.	2.33	1.152		
		I must use my mobile device for hiking.	2.66	1.268		
		Using my mobile device for hiking has become routine for me.	3.17	1.208		
	safety	Using my mobile device for hiking makes me safer.	3.54	1.113	.924	.753
		I feel comfort when hiking with my mobile device.	3.60	1.080		
		My mobile device is useful safety tool for my hiking.	3.67	1.063		
		My mobile device helps me identify safe hiking conditions.	3.67	1.013		

RESULT

Descriptive statistics

The total number of participants who agreed to participate in the study was 432, with Canadians accounting for 198 and South Koreans accounting for 234. Among the initial participants, 24 responses that had a significant number of missing values and 9 responses without any demographic information were deleted. Thus, a total of 399 responses from hikers were used for the final analysis.

The responses with missing values were tested for their randomness. Little's MCAR test yielded a non-significant value for the Canadian sample (Chi-square =2285.908, df =2183, p =.061). The South Korean sample did not converge with the test, but the separate variance of t-test results was non-significant. Thus, both samples were missing at random. The EM algorithm imputation method was executed for both national samples to complete the final dataset. The EM algorithm missing value imputation has shown the least biased results in PLS-SEM analysis, outperforming other methods such as pairwise deletion or mean substitution (Kristensen & Eskildsen, 2010).

Distribution normality of the dataset was also assessed prior to the structural model analysis. Although the PLS-SEM is known for its relative strength in treating non-normal data due to non-parametric estimation, recent PLS-SEM guidelines suggest being careful to avoid overly non-normal distribution (Henseler, Hubona, &

Ray, 2016; Kono, Ito, Walker, & Gui, 2019). The skewness and the kurtosis of the final dataset yielded values within -3/+3 range for all the indicators; thus, it can be concluded that the dataset is close to normal distribution. Table 4.2 summarizes descriptive statistics for the overall sample, and Table 4.3 represents the same results separately for the Canadian and South Korean samples.

Table 4.2. Frequency analysis of demographics (overall sample)

		n	%
Country	Canada	187	46.9
	South Korea	212	53.1
Gender	Male	200	50.1
	Female	197	49.4
	Other/Prefer not to answer	2	0.5
Education	Elementary school	9	2.3
	High school	52	13.0
	College diploma/ apprenticeship	44	11.0
	Some university	38	9.5
	University Bachelor's degree	150	37.6
	University Graduate's degree	106	26.6
Hiking duration	1 hour or less	40	10.0
	1 to 3 hours	249	62.4
	More than 3 hours day trip	100	25.1
	Overnight trip	10	2.5
Hiking frequency	Once a season and less	120	30.1
	More than once a season -Once a month	131	32.9
	Morea than once a month -Once a week	109	27.4
	More than once a week	39	9.8
Total n		399	

	Mean	SD
Age	40.3	16.2
Perceived experience level at hiking	58.8/100	22.0

Table 4.3. Frequency analysis of demographics (separate cultural groups)

		CAN (n=187)	%	KOR (n=212)	%
Gender	Male	82	43.9	118	55.7
	Female	103	55.1	94	44.3
	Other/Prefer not to answer	2	1.1	0	0
Education	Elementary school	3	1.6	6	2.8
	High school	15	8.0	37	17.5
	College diploma/ apprenticeship	20	17.7	24	11.3
	Some university	8	4.3	30	14.2
	University Bachelor's degree	76	40.6	74	34.9
	University Graduate's degree	65	34.8	41	19.3
Hiking duration	1 hour or less	22	11.8	18	8.5
	1 to 3 hours	114	61.0	135	63.7
	More than 3 hours day trip	42	22.5	58	27.4
	Overnight trip	9	4.8	1	0.5
Hiking frequency	Once a season and less	49	26.2	71	33.5
	More than once a season - Once a month	76	40.6	55	26.0
	Morea than once a month - Once a week	50	26.7	59	27.9
	More than once a week	12	6.4	27	12.7
Total n		187		212	

	Mean	SD	Mean	SD
Age	35.1	14.2	45	16.4
Perceived experience level at hiking	60.6/100	22.1	57.2/100	21.8

Structural model specification and validation

This study utilized a disjoint two-stage approach in specifying HCM (higher-order construct modeling). First of all, HCM specification was employed for its advantages such as model parsimony and reducing collinearity among formative indicators (Hair, Sarstedt, Ringle, & Gudergan, 2017; Sarstedt, Hair, Cheah, Becker, & Ringle, 2019). Second, a two-stage approach, a disjointed one in particular, was utilized for its strength in moderator analyses (Becker, Ringle, & Sarstedt, 2018; Sarstedt et al., 2019). The PLS path analyses were conducted using SmartPLS 3 program. By using the statistical package, alpha inflation concerns due to multiple hypotheses is controlled for.

In the first stage of the two-stage approach, the path coefficient scores only among lower-order constructs were estimated and saved as indicators in the dataset, without specifying the higher-order constructs in the model. Then, in the second stage, the saved scores were specified as the measurements of the higher-order constructs. The structural model after the second stage is indicated in Figure 4.2. The eight extended UTAUT2 variables are formatively specified toward their higher-order latent variable UTAUT2. The constraints, the motivation, and the negotiation latent variables are formatively specified with their lower-order measurements score. The latent variable UTAUT2 and its lower-order constructs were not included in the first stage's path modeling because it does not involve any higher-order endogenous variables. The figure 4.3 indicates path analysis results.

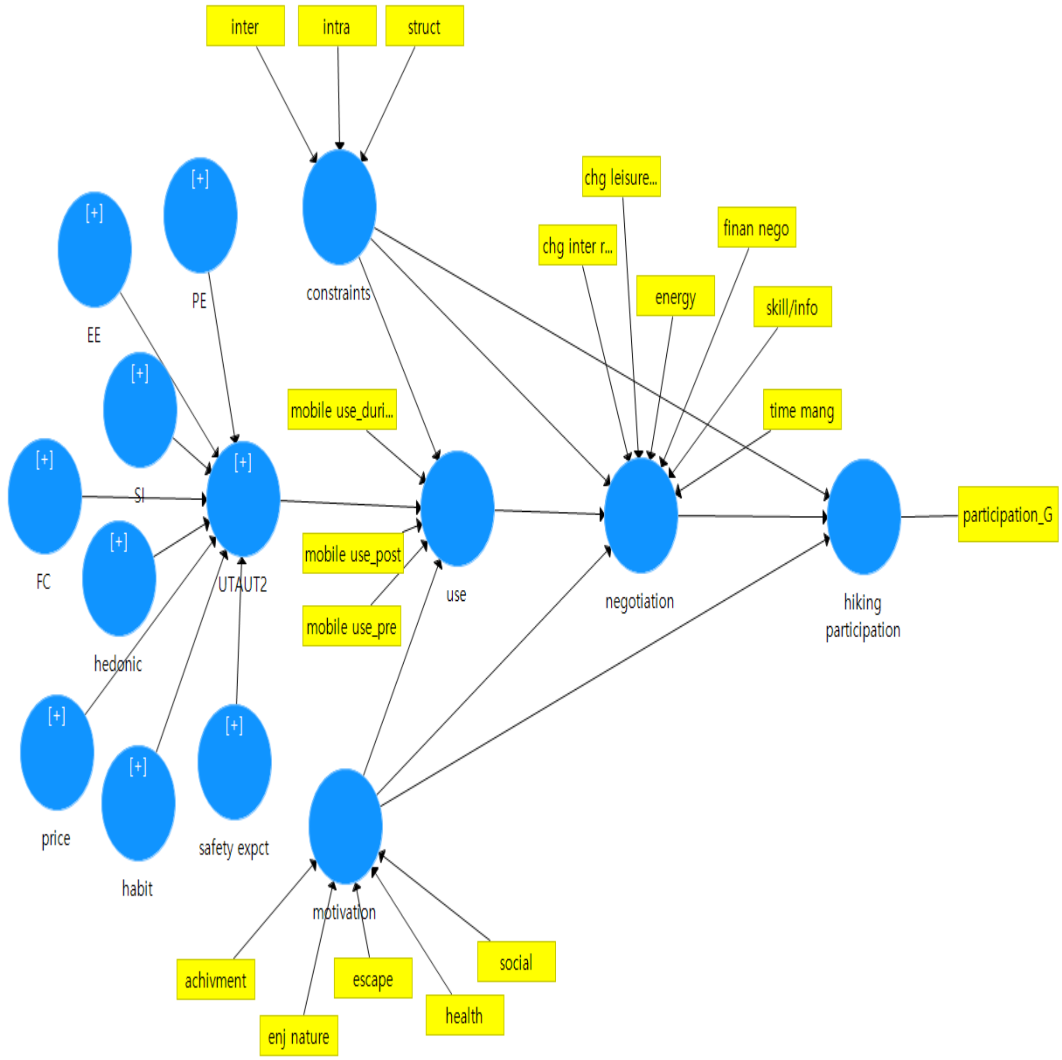


Figure 4.2. Second stage of the two-stage approach HCM

The final structural model was examined for its validity. The VIF (variance inflation factor) of the lower-order measurements were all below 5.0, meaning the model is free of multi-collinearity issues. The R-square value on the UTAUT2 was .986, mobile device use was .560, negotiation was .548, and participation was .094. While the R-square of the paths toward participation yielded a rather small explanation power, the other paths showed moderate to large sizes. The low R-square value on hiking participation may be the result of the homogenous sample derived for this study, that is, all were hikers who succeeded at engaging in a hiking trip, successfully navigating constraints they may have experienced. The effect size f-square values of the path from the motivation to the use and the path from the negotiation to the participation were less (.019 and .011, respectively) than the threshold of the small effect size, but the other paths showed small to large effect sizes.

The significance of outer weights and outer loadings were tested for validation of formative HCM specifications in the final model. The outer weights significance level of 28 indicators was non-significant. As a next step, the outer loading significance levels of those 28 indicators were assessed, and they were all significant. Thus, the formative specification of the final structural model was confirmed as valid.

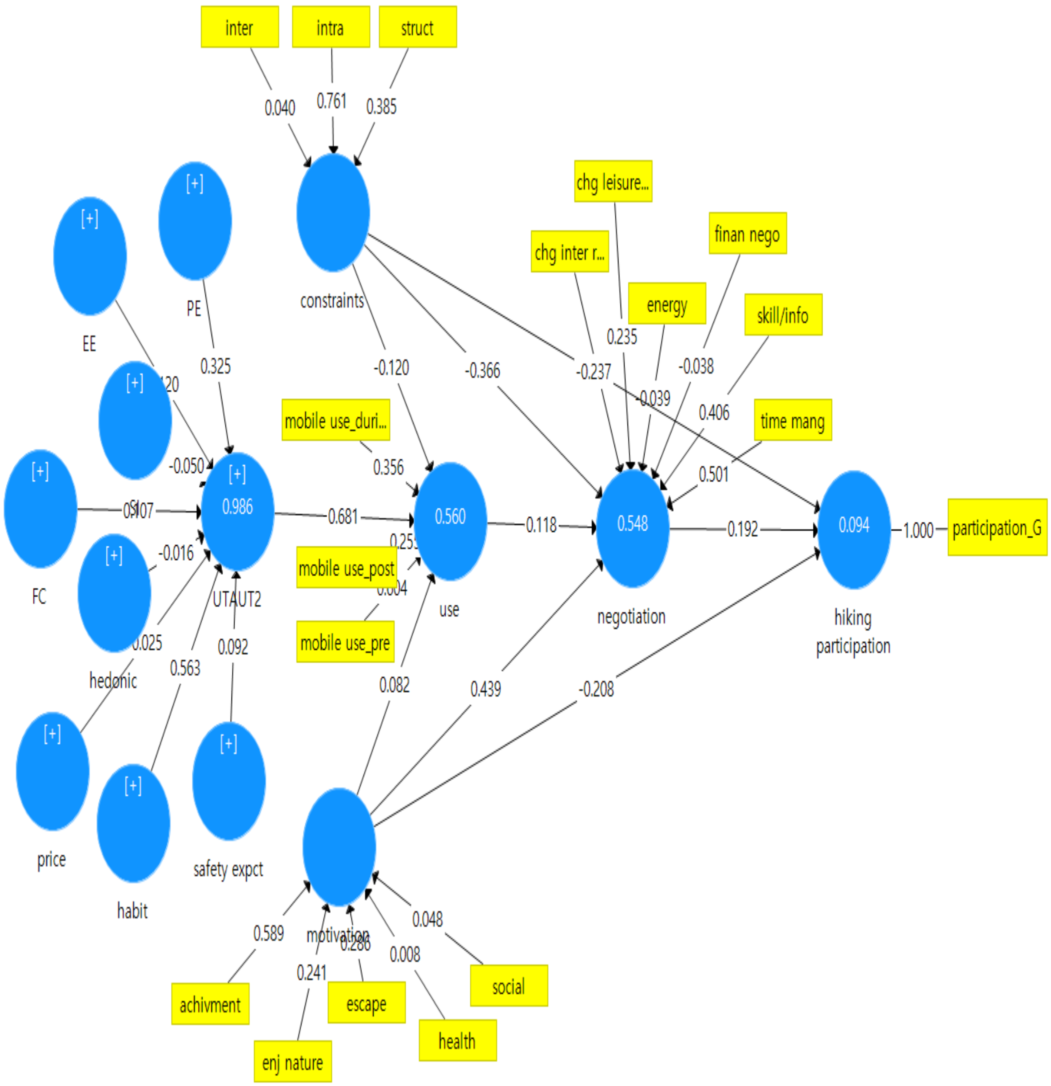


Figure 4.3. PLS-SEM model path analysis results

Structural model results

A bootstrapping analysis with 5,000 subsamples using a bias-corrected and accelerated (BCa) method was computed for the structural model. The path between the constraints and the negotiation was significant but negative (β= -.366, p <.001). This result was opposite from what was hypothesized. The relationship between the constraints and participation in hiking was negatively significant (β= -.237, p <.001). The constraints had a significant negative effect on the mobile device use (β= -.120, p =.003). Motivation's positive effect on the negotiation was significant (β= .439, p <.000). Motivation had a significant effect on the participation but negatively, as opposed to the hypothesize relationship (β= -.208, p =.009). The path between the motivation and the mobile device use was non-significant (β= .082, p =.063). Negotiation had a significant positive impact on the hiking participation (β= .192, p =.027). The UTAUT2 construct was positively related to the mobile use (β= .681, p <.001)., and mobile use was also positively related to the negotiation (β= .118, p =.002).

The specific indirect effect from the UTAUT2 through mobile device use towards negotiation was positively significant (β= .080, p =.003), and its variance accounted for (VAF) indicates full mediation. The indirect effect from the constraints through the use towards negotiation was negatively significant, but no mediating effect can be detected since its VAF was only 3.7%. Estimating partial mediation requires a VAF of at least 20%, and 70% or larger VAF is required for full mediation

(Hair et al., 2016; Halpenny, Kono, & Moghimehfar, 2018; Wong, 2016). The negative partial mediation effect of the negotiation was found between constraints and hiking participation. On the other hand, a positive partial mediation of the negotiation was found between motivation and hiking participation. Table 4.4 summarizes the path results.

Table 4.4. The path analysis and bootstrapping results (overall sample)

Path coefficient	ß	t	Sig.	f^2
constraints -> negotiation	-.366	8.331	.000	.232
constraints -> hiking	-.237	4.416	.000	.039
constraints -> use	-.120	2.928	.003	.026
motivation -> negotiation	.439	9.273	.000	.312
motivation -> hiking	-.208	2.630	.009	.027
motivation -> use	.082	1.862	.063	.011
negotiation -> hiking	.192	2.211	.027	.019
UTAUT2 -> use	.681	20.343	.000	.929
use -> negotiation	.118	3.064	.002	.026
UTAUT2*age -> use	.004	2.343	.020	.012
Constraints*age -> negotiation	.006	1.982	.048	.017
Specific indirect effect	**ß**	**t**	**Sig.**	**VAF**
UTAUT2 -> use -> negotiation	.080	2.995	.003	1.00 (full)
constraints -> use -> negotiation	-.014	2.078	.038	.037 (none)
constraints -> negotiation -> hiking	-.070	2.375	.018	.225 (partial)
motivation -> negotiation -> hiking	.084	2.267	.023	.689 (partial)

Moderation/multi-group analysis (PLS-MGA)

The moderation analysis of age, perceived hiking experience level, and culture (country) are part of the structural model hypotheses. For the continuous moderating variables, which are age and hiking experience level, a moderation analysis using an orthogonalization approach with mean-centering was performed among the higher-order paths (Ramayah et al., 2018). As a result, only age had a significant moderating effect on the path from the UTAUT2 to mobile device use and from the constraints to the negotiation. Although significant moderations were detected, the effect size f-square of the moderation paths were smaller than .02 thresholds. The moderation path results are also depicted in Table 4.4.

The moderating effect of the cultural differences was assessed using multi-group analysis (PLS-MGA). The PLS-MGA procedure of the SmartPLS 3 program compares the structural path ways estimation of the two different group samples. Prior to executing the PLS-MGA, MICOM (measurement in variance of composite models) was assessed to confirm whether the Canadian sample and the South Korean sample were statistically comparable. The MICOM procedure yielded permutation p-values smaller than .05 for the UTAUT2 (p =.007) and the negotiation (p =.006) variables. Thus, the measurements' compositional invariance is not statistically supported, and the PLS-MGA comparison is not valid (Hair et al., 2017). The non-invariance in measurements between two national groups indicates that the two groups are similar samples although they are from different cultures. Nevertheless, a separate path analysis of the Canadian group and the South Korean group is still meaningful for the interpretation of characteristics of each sample group (Hair et al., 2017; Kono et al., 2020). Table 4.5 reports the separate structural paths analysis of the Canadian sample and the South Korean sample.

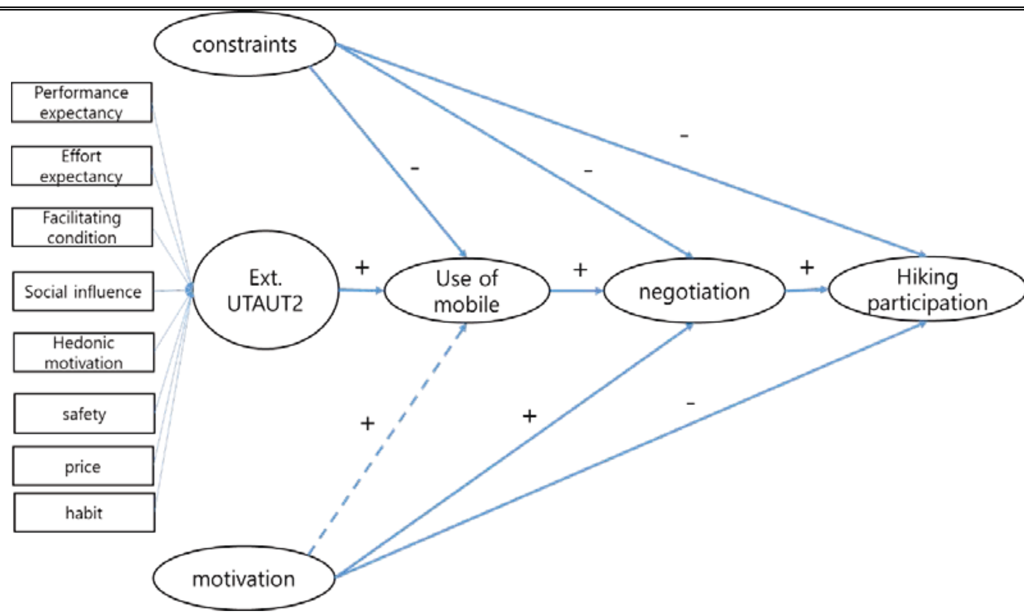
Table 4.5. The path analysis and bootstrapping results (separate cultural groups)

Canadian sample	ß	t	Sig.	f^2
constraints -> negotiation	-.344	3.307	.001	.202
constraints -> hiking	-.108	1.301	.193	.010
constraints -> use	-.087	1.804	.071	.016
motivation -> negotiation	.396	3.515	.000	.217
motivation -> hiking	-.074	.781	.435	.004
motivation -> use	.205	3.676	.000	.079
negotiation -> hiking	.236	1.874	.061	.034
UTAUT2 -> use	.644	13.874	.000	.844
use -> negotiation	.169	2.175	.030	.041
South Korean sample	ß	t	Sig.	f^2
constraints -> negotiation	-.315	5.14	.000	.168
constraints -> hiking	-.362	4.419	.000	.122
constraints -> use	-.125	2.177	.030	.040
motivation -> negotiation	.472	7.386	.000	.394
motivation -> hiking	-.073	.737	.461	.004
motivation -> use	-.012	.271	.786	.000
negotiation -> hiking	.147	1.503	.133	.014
UTAUT2 -> use	.770	22.999	.000	1.489
use -> negotiation	.154	2.739	.006	.040

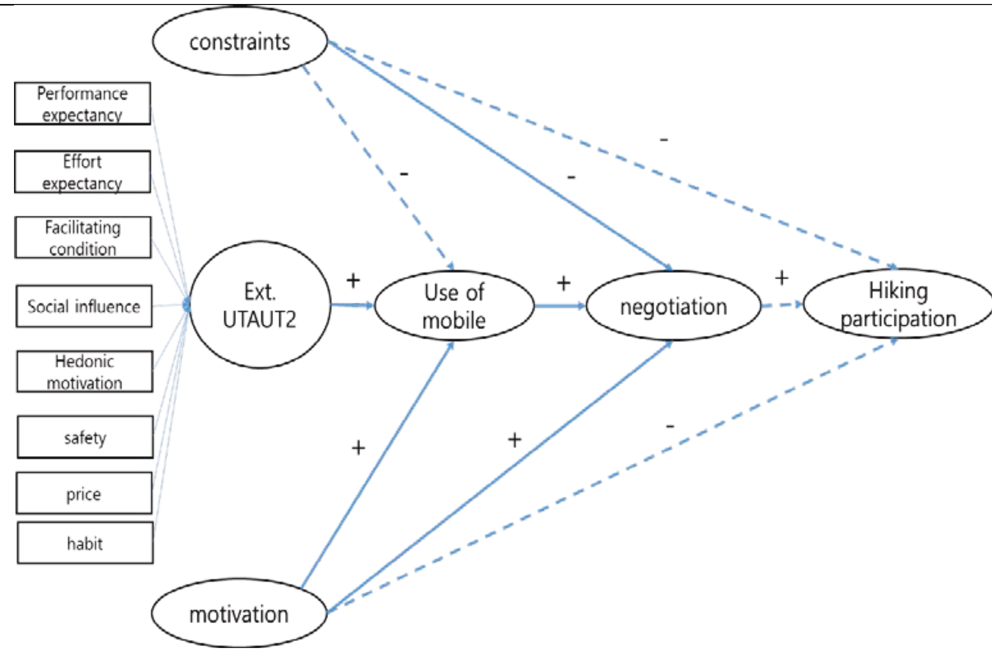
The negative paths from constraints to both hiking and mobile device use were only significant in the South Korean sample. On the other hand, motivation's effect on mobile device use was only significant in the Canadian sample. In fact, the non-significant path between motivation and mobile device use in the South Korean sample yielded a surprisingly low effect size (f-square =.000). Table 4.6 indicates the significance and non-significance paths.

Table 4.6. The paths significance image for overall and cultural separation

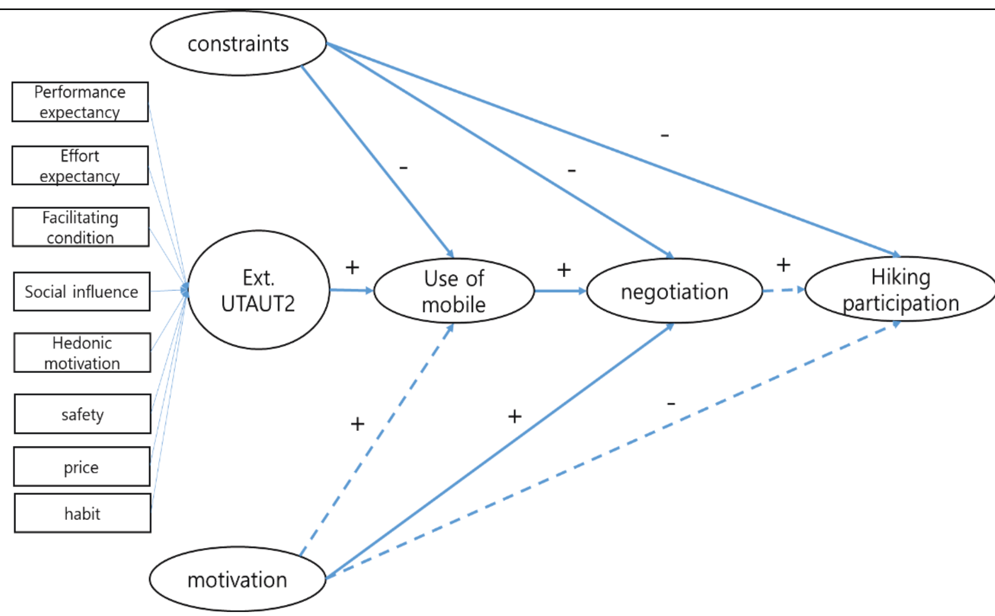
The path significance of overall sample



The path significance of Canadian sample



The path significance of S. Korean sample



DISCUSSION AND CONCLUSION

The main purpose of this study was to integrate the leisure constraints-negotiation model and the extended UTAUT2 model in an outdoor recreation context to theoretically explore whether using mobile devices can help facilitate mountain hikers' leisure constraints and negotiation processes or not. The secondary purpose was to examine the cultural similarities or differences between the two national groups, Canadian hikers and South Korean hikers, through the integrated model. An examination of moderation role of age and perceived hiking experience level was also a study objective.

Theoretical implications

The integrated model's validation should first be discussed. The model integration of the constraints-negotiation model and the UTAUT2 model in this study, is the first of its kind. The model's validation was supported as reported in the Findings. Although the concept of a model fit test for PLS modeling and its formative specification has yet to be fully developed as its CB-SEM counterpart has been, this study's integrated structural model was validated using guidelines recommended for VIF, R-square, and f-square values (Hair et al., 2016; Hair et al., 2017). The model was confirmed to be free of multi-collinearity issues. In terms of low R-square on hiking participation, increased heterogeneous sampling to include a wider range of respondents is encouraged, particularly those who have never or rarely negotiated constraints relating to hiking opportunities (i.e., inexperienced, non-hikers). This can be achieved by conducting survey intercepts in everyday environments and not at hiking destinations

The main connection between the existing models was the use of the mobile device construct. Therefore, the explanatory power and the effect size of relationships surrounding the use of mobile devices is discussed next. In terms of R-square values, the percentage of variance explained for mobile device use was .560, which is a considerable level of explanatory power. Except for the effect from motivation to use of mobile devices, the f-squared values of the cross-model relationships in and out of the use of mobile devices construct each demonstrated a significant small effect size (Cohen, 2013; Hair et al., 2016).

The path coefficients and their significance in the model also indicated the logic behind the model integration was reasonable. The significant positive relationship between use of mobile devices and leisure negotiation strategies was the most noteworthy finding of this study. This significant path relationship is the main bridge between the extended UTAUT2 model and the constraints-negotiation model, which indicates that using mobile devices helps or facilitates outdoor recreationists' various negotiation strategies to circumvent barriers to their leisure activities, in this case mountain hiking. For instance, a hiker might use a smartphone at the planning stage (pre-use) of a hiking trip to look for a trail that suits his or her fitness level or for transportation and access routes to the destination. A hiker might access the internet while hiking (during-use) to check the weather in real time or track one's speed with the GPS function to pace oneself correctly for a certain fitness level. A hiker also may want to post a picture of a hiking activity or a scenic view on the internet to share experiences and may look for a hiking companion through social media activities for a future trip (post-use).

Furthermore, the full mediation relationship was detected from the extended UTAUT2 through the use of mobile device construct towards leisure negotiation. This full mediation reinforces the justification of integrating the theoretical model, making it another highlight of this study's findings. Among the UTAUT2's lower-order constructs, performance expectancy and habit were most strongly connected. Examples of the mediating relationship paths could be how a hiker who believes the smartphone is a useful tool for hiking activity would more likely actually use the device for hiking, and it most likely would help the hiker in employing leisure negotiation strategies. In theory, this process should be connected to an increase in leisure participation, but the full mediation failed to influence hiking participation in this study. However, the relationship between negotiation and participation was statistically significant, separately. The probable path logic stands.

This study's design was primarily inspired by White's (2008) study, who noted that motivation to participate in outdoor recreation may facilitate negotiation strategies and resources to alleviate barriers. The idea that the resources an individual might employ for this negotiating of the constraints process could be a mobile device was the foundation of this current study (Wang & Fesenmaier, 2013; Wang et al., 2012). Thus, motivation's positive relationship with mobile use pre-, during, and post-hiking was also one of the expected outcomes, but results yielded otherwise. Motivation's impact on mobile device use was non-significant and had less than a small effect in the model. A possible explanation for this result may be the integrated model specification. Motivation may influence use of mobile devices significantly when mediated by UTAUT2 constructs, since the UTAUT constructs have demonstrated a mediation role in previous research (Brown et al., 2010; Chun, Lim, & Lee, 2016; Jackson, Mun, & Park, 2013; Maillet, Mathieu, & Sicotte, 2015; McKenna, Tuunanen, & Gardner, 2013). For instance, Chun et al. (2016) analyzed wearable device acceptance in recreational sport participation and found UTAUT constructs' mediating role between sport commitment and behavioral intention to use a wearable device. This was an alternative finding to their initially hypothesized model that was designed to extend UTAUT constructs with a sport commitment variable.

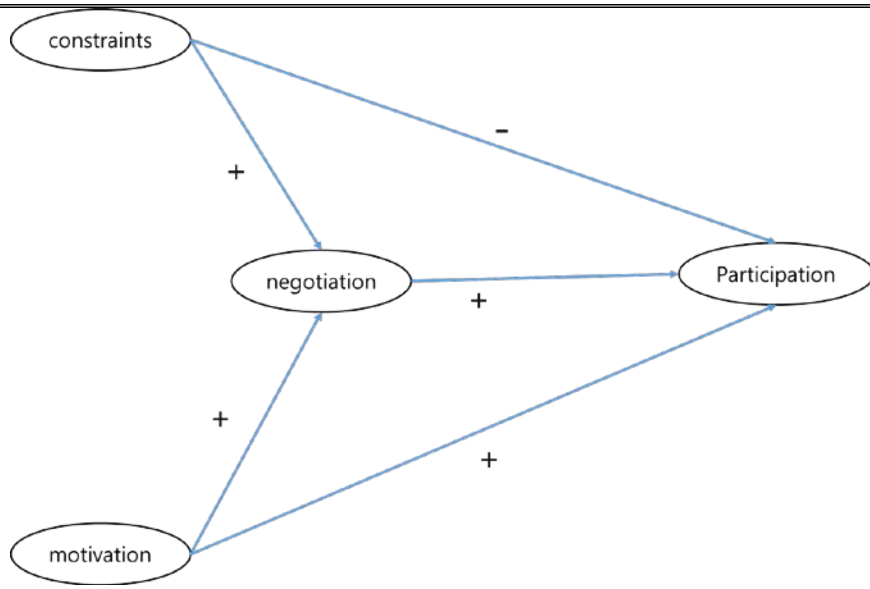
Although not significant in the overall sample's analysis, the path between motivation and the use of mobile devices was significant only among Canadian hikers when country samples were analyzed separately. The sub-group analysis does not necessarily indicate that the two groups' results are statistically different, but it is capable of suggesting how each group's coefficients contribute to the overall sample's outcome. For the particular path between motivation and use of mobile device, the Canadian sample yielded positive, significant coefficients with small-medium effect sizes (f-square =.079), whereas it was the South Korean sample that undermined the overall impact with its negative non-significance and zero effect size. This outcome indicates that the Canadian hikers' motivation to hike is more likely connected to their actual mobile device use behavior, whereas South Korean hikers may need alternate behavioral triggers. This interpretation comes as somewhat of a surprise in that South Korean culture was supposed to be the more predisposed toward using ICTs since South Korea is one of the world's most developed ICT countries (Craven, 2019; Smith, 2016). This may be because the hikers' sample does not necessarily represent a whole country's cultural characteristics. The majority of the hiking population in South Korea is made up of people of middle ages and older, rather than younger, people (Choi & Choi, 2017; Schuett, Lee, Choe, & Sim, 2016). In fact, the South Korean sample's mean age was almost 10 years older than that of the Canadian sample in this study. Previous studies have suggested that younger and older people hold diverse mobile technology and ICT use preferences and engage with ICT differently (Kubiatko, 2013; Zhou, Rau, & Salvendy, 2014). This may be even more pronounced in nature-based leisure settings – where generational differences may exist. However, more study of this would need to be engaged into refute or support this speculation.

On the other hand, it was mainly the South Korean sample which contributed more to demonstrating the effects of constraints towards the participation and use of mobile device pre-, during, and post-hiking. The Canadian hikers' leisure constraints had a non-significant and less than small effect on both the use of mobile and hiking participation, while the South Korean sample impacted the same variables significantly in a negative direction with a small effect size. This was also demonstrated in the combined countries sample. Although the negative relationship between the constraints and the use of mobile devices may need a model specification discussion (the use of mobile as an exogenous variable) (see Study 1), the path result between constraints and participation indicates that the South Korean hikers are more constrained in participating in their hiking activities. The self-construal theory of Markus and Kitayama (1991) may be able to explain this difference. The previous cultural difference studies in leisure research argued that Western society tends to show independent self-construal that values individualism more, whereas Eastern and other cultures have a tendency to hold interdependent self-construal, which is weighed towards collectivism (Walker et al., 2001; Walker, Deng, & Dieser, 2005; Walker, Jackson, & Deng, 2007). It is possible that the South Korean hikers more likely let barriers such as demands and responsibilities from life, work, and family compromise their hiking activities; their leisure behavior is more sensitive to social norms and others' thoughts. Previous studies such as Chick et al. (2015) indicate that their Taiwanese participants, who are also people from one of the Eastern cultural countries, tend to have more interdependent self-construal, frequently reporting leisure constraints issues related to family obligations.

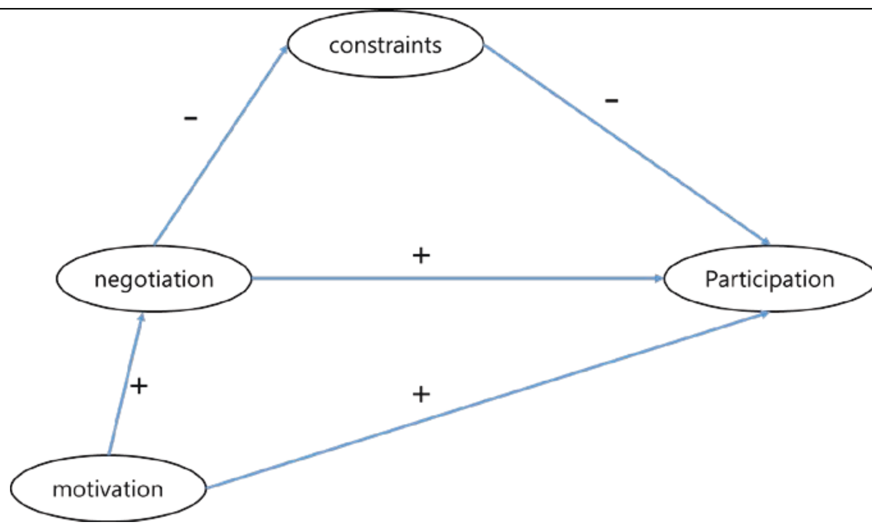
Hiking constraints' constant negative effect on all the variables that were related, other than towards participation, was disappointing but not unexpected. Many previous studies that assessed the leisure constraints-negotiation model reported inconsistent results for the path between the constraints and the negotiation. In terms of the constraints-effect-mitigation model analysis that this study borrowed, some previous studies yielded non-significant relationships (Kono et al., 2019; Li, 2020; Ma & Ma, 2014; Son et al., 2008; Wilhelm Stanis et al., 2009) and others reported a negative relationship for the path (Boo, Carruthers, & Busser, 2014; Jun & Kyle, 2011; Lyu & Oh, 2014; Lyu, Oh, & Lee, 2013; Powers, Trauntvein, Barcelona, & Hartman, 2019). While this relationship was hypothesized to be positively related, the negative relationship between constraints and negotiation reported among the mitigation model analysis, including in this study, suggests that the perceived-constraint-reduction model (see Table 4.7) may be a better explanatory model (Hubbard & Mannell, 2001; Kono et al., 2020). Since the use of mobile devices was conceptualized as an antecedent that facilitates the negotiation variable, it should most likely be related to the constraints in a similar manner as it is to the negotiation.

Table 4.7. Hubbard and Mannell's (2001) the mitigation model and the reduction model

The constraints-effects-mitigation model



The perceived-constraint-reduction model



The negative path between the motivation and the participation was unexpected since no previous research had found this relationship. The explanation and debate regarding the competing constraints-negotiation models (Hubbard & Mannell, 2001) may also be applied to explain the negative relationship between motivation and participation. However, the partial mediation from the motivation through the negotiation towards hiking participation, with VAF nearly meeting full mediation criteria, may be a better explanation for this study's specifics. A number of researchers have suggested motivation's effect on leisure participation has been achieved mainly via negotiation strategies' mediating role (Hubbard & Mannell, 2001; Jackson, Crawford, & Godbey, 1993; Ma & Ma, 2014; Son et al., 2008). Since the structural model of constraints-negotiation in this study is based on the balance proposition suggested by Jackson et al. (1993), the nearly full mediation effect found among motivation, negotiation, and participation in this study should be the focus, rather than the direct negative effect from the motivation to the participation. In fact, the relationship became non-significant and close to a zero effect size (f-square =.004) when analyzed separately in the two country samples.

No discussion-worthy moderation effect was found in the overall model analysis; this includes age and cultural differences. Age's positive moderating effects on the path between the UTAUT2 and the use of mobile, and the path between the constraints and the negotiation was found to be significant, but the effect sizes were less than small for both (.012 and .017, respectively). Cultural moderation could not be reported since the statistical differences between the two national groups were not supported. The discussion points mentioned regarding the national groups in this study are only limited to path comparisons but not empirical differences based on moderation analysis outcomes. Some previous studies have examined measurement invariance in leisure constraints and constraint negotiation to compare cultural groups (Casper et al., 2011; Guo & Schneider, 2015; Kono et al., 2020). These studies, combined with this current study, have commonly found non-invariance in measurement model across cultural groups which limits the moderating effect analysis. Kono et al. (2020) noted that this consistent non-invariance detection should inspire researchers to develop and utilize theoretical measurements that are specific to various cultural contexts.

Additional constructs or variables may reveal statistically different characteristics between Korean and Canadian hikers. For instance, measuring psychological aspects such as risk tolerance or structural aspects such as transportation infrastructure could reveal significant differences between the cultures. It is recommended for future studies to capture these potential differences between national samples for deeper understanding.

Limitations and practical implications

There are limitations in this study to be discussed. First, just as with the majority of other studies regarding these topics, this study used cross-sectional research. The relationships found in this study should be understood as associations but cannot expand their meanings to causal; however, this limitation also helped increase an understanding of the unexpected negative relationships between variables observed in this study.

Second, the sampling from the two different countries may have been different in some aspects. The survey and sampling methods for both countries followed the same procedures, but certain circumstantial differences (e.g. location, weather, daylight duration, surveyors, etc.) are simply unavoidable. For instance, the 10-year differences in the mean age between the Canadian sample and the South Korean sample may have induced some anticipated bias in the results. In extension to the sampling limitation, a small number of the sample answered paper-based questionnaire instead of electronic version. While this variance types of data collection may need to be stated as a limitation, it was less than 5% of the samples.

Third, the measurement for leisure participation could be improved. Hiking participation was measured with a combination of the frequency of hiking activities per year and the duration of hiking routes planned. While a duration measure grasping the objective and usual time spent on hiking may be an improvement, adding intensity level measurement to the combination would be another improvement. Leisure participation as a LTPA (leisure-time physical activity) commonly utilizes the measurement combination of frequency, duration, and intensity (Kono et al., 2019; Son et al., 2009; Son et al., 2008; Stanis, Schneider, & Pereira, 2010; Wilhelm Stanis et al., 2009). Leisure studies that are interested in participation as a leisure activity engagement, including this study, typically use either frequency (Powers et al., 2019; Schneider & Wynveen, 2015; Schroeder, Fulton, Lawrence, & Cordts, 2012) or sometimes behavioral intention (Chung, Baik, & Lee, 2017; Lyu & Oh, 2014; Moghimehfar & Halpenny, 2016; Moghimehfar, Halpenny, & Walker, 2018) to measure leisure participation.

The formative measurement design of leisure constraints in this study may have some shortcomings due to lack of statistical testing of the formative constructs. Even though the measurement design was supported with its theoretical verification, there is still a possibility that the three-factor leisure constraints factor and its items are short in explaining all the aspects of the constructs. This should be confirmed with future research by applying rigorous statistical tests.

The findings that an individual's belief in benefits of and familiarity towards mobile devices related to hiking leads to the actual use of the devices and eventually facilitates a person's negotiation strategies to participate in hiking activities inspires some practical insights. First, manufacturers of mobile devices such as smartphones and tablet PCs, or application developers may find it useful to produce hiking related programs or apps that directly address specific negotiation strategies researchers have identified as important. For example, a smartphone app that helps people find people to hike with, an smartphone alarm system or app that updates real time safety matters in the parks, open information on crowdedness of mountain trails will be able assist hikers' negotiation strategies. Second, parks management could communicate or share information more extensively through websites (e.g. local destination marketing organizations' and the park agency's sites) and social media to promote, manage and demarket visits by park visitors. Parks management could also develop an educational program that could be accessed online to promote deeper engagement with park visitors. For instance, since the safety issue has shown strong impact on mountain hikers' behavior, information and education regarding safety that are instantly updated online through channels such as social media and trail navigation apps will be an effective way to communicate and educate park visitors.

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Chapter 5

OVERALL DISCUSSION AND CONCLUSION (SUMMARY)

This dissertation is consisted of a series of three studies to uncover the behavioral mechanism of mountain hikers' use of mobile devices such as smartphone and its role on hikers' leisure constraints and negotiation process. The first study (Study 1) was designed to examine the leisure constraints-negotiation theory through the constraints-effect-mitigation model (Hubbard & Mannell, 2001) in outdoor recreation, namely, in a mountain hiking context. In doing so, the cultural differences and similarities between Canadian and South Korean participants were also explored. The second study (Study 2) was designed to examine mountain hikers' acceptance and actual use of mobile devices for hiking through extended UTAUT2 model. The UTAUT2 model used in Study 2 was extended with the safety expectancy exogenous variable and three different stages of the actual use of mobile devices in order to better explain in outdoor recreation context. From the theoretical conceptualizations of the Study 1 and study 2, the third study (Study 3) examined the integrated theoretical model of leisure constraints-negotiation theory and the extended UTAUT2 in order to explore the role of mobile device use for hiking on the hikers' leisure constraints and negotiation behaviors.

The outcome and discussion of the Study 1 of this dissertation can be summarized as follows. First, Hubbard and Mannell's (2001) constraint-effects-mitigation model was not fully but only partially supported. The inconsistent support for the constraint-effects-mitigation model, or any other model specifications of Hubbard and Mannell (2001), is common (Kono, Ito, Walker, & Gui, 2020; Li, 2020; Ma & Ma, 2014; Son, Mowen, & Kerstetter, 2008; White, 2008; Wilhelm Stanis, Schneider, & Russell, 2009). The partial model support in the Study 1 suggests that the path relationships of Son et al.'s (2008) dual-channel model may be a better model to explain the leisure constraints-negotiation theory (Kono et al., 2020; Son, Kerstetter, & Mowen, 2009), especially since the partial mediation effect of the negotiation between the motivation and the participation were close to full mediation. At the same time, however, Kono et al. (2020) warned that the dual-channel model may be a better explanation model but the occurred change from the constraint-effects-mitigation model could weaken its predictive power. Additionally, the negative relationship between the constraints and the negotiation in the Study 1 suggests that the perceived-constraint-reduction model (Hubbard & Mannell, 2001) should be more thoroughly examined. In conclusion, the leisure constraints-negotiation theory needs further research in different contexts and with different populations to find a valid, universally-applicable theoretical model. common

Second, no statistically valid moderation effect of cultural differences between the Canadians and the South Koreans were found in the study 1. Nevertheless, some noteworthy comparison points emerged from sub-group path analysis. The negative path from the constraints towards the participation was only significant among the South Korean sample, and the positive path from the negotiation towards the participation was only significant among the Canadian sample. A possible explanation could be that the theoretical concept of the leisure constraints and negotiation may be more suited for the individuals in Western culture because of its origins from Western research contexts (Ito, Kono, & Walker, 2018). Another explanation could be that more interdependent counterpart, the South Koreans, may be more constrained and often fail to circumvent the barriers for their leisure activity compared to the Canadians who are considered to hold more independent self-construal in general (Markus & Kitayama, 1991; Walker, Deng, & Dieser, 2005; Walker, Jackson, & Deng, 2007).

The outcome and discussions of the Study 2 can be summarized as follows. To the best of my knowledge, Study 2 is the first study which applied UTAUT2 model for in the context of mountain outdoor leisure activity. Additionally, the Study 2 extended the UTAUT2 model with addition of the safety expectancy construct as an exogenous variable and separation of the actual use into three stages (before, during, and after). The extended UTAUT2 model's explanation power stands fairly strong with small to moderate R-square values in this study. In fact, the R-square value went up by 6% when the newly introduced the safety expectancy construct was added to the model. The safety expectancy construct was added in the model in order to better grasp mountain outdoor activity contexts and it appeared to be the strongest predictor among other UTAUT2 constructs (Bettini & Mascetti, 2016; Boller, Hunziker, Conedera, Elsasser, & Krebs, 2010; Darcy, 2016; Sharp, 2001; She et al., 2019). Thus, the safety expectancy extension deserves more academic attention when examining the UTAUT2 model in the future, particularly in environments that posed higher levels of risk for individuals to navigate.

Second, the path coefficients and their significance levels of existing UTAUT2 constructs were somewhat unexpected. Only three constructs, the performance expectancy, the facilitating condition, and the habit, were significant. Even within the three significant constructs, two of their effect sizes did not achieve the minimum small effect size criterion (the performance expectancy and the habit). Other than the safety expectancy construct, the facilitating condition showed the strongest impact among the already existing UTAUT2 constructs. It could be a possible explanation that mountain hikers may be more concerned about mobile connectivity, battery life, and other capability issues of using mobile devices due to the specific geographical characteristics of mountains where it is remote and fewer ICT resources compared to urban area (Warner, Adanin, & Szolosi, 2020).

On the other hand, all the three different stages of the actual use of mobile devices were significantly impacted by the behavioral intention. This result was expected and hypothesized based on the conceptualization from Tussyadiah and Wang (2016). The findings of this dissertation supports the conceptualization of the pre-use such as hotel booking and seeking access information (San Martín & Herrero, 2012; Van Winkle, Bueddefeld, Halpenny, & MacKay, 2019); the during-use such as navigation, weather forecasts, taking pictures (Warner et al., 2020); and post-use such as posting hiking pictures on the social media (Robertson, Yeoman, Smith, & McMahon-Beattie, 2015; Van Winkle et al., 2019) through the theoretical model.

Third, no significant moderation effect was found among age and culture variables. However, in sub-group path model analysis between the Canadian and the South Korean samples revealed the consistent and strong effect of the newly introduced safety expectancy construct in both groups, while other path relationships showed mixed results. The consistent outcomes across the cultures confirm the strongest impact of the safety expectancy and its justification to be included in the extended UTAUT2 model for outdoor recreation research.

The outcome and discussions of the Study 3 can be summarized as follows. First, the theoretical model used in the Study 3 was integrated from the constructs of the leisure constraints-negotiation theory and the UTAUT2 model, which were examined and explored in the Study 1 and 2 of this dissertation. The model integration and specification of the Study 3 was centered around the use of mobile device (before hiking, during hiking, and after hiking). The significant positive connection between the mobile device use and the negotiation variables supports the model integration, and the full mediation detected from the UTAUT2 through the use of mobile device towards the negotiation especially confirms the justification of the theoretical model integration. The idea, that one of the resources an individual might employ for negotiating the constraints process could be a mobile device, can be supported through the Study 3's model (Wang & Fesenmaier, 2013; Wang, Park, & Fesenmaier, 2012; White, 2008).

The constraints and the motivation variables of the constraints-negotiation theory showed relatively weaker theoretical connections among use of mobile devices with negative and non-significant paths. However, further research with the adjusted model specification may be able to solve these weak connections. For instance, constraints' negative impact suggests that the perceived-constraint-reduction model specification should be tried (Hubbard & Mannell, 2001; Kono, Ito, Walker, & Gui, 2019). Also, the motivation may be able reach the use of mobile device significantly when mediating through the UTAUT2 constructs, since the UTAUT constructs have shown a meditation role via previous research (Brown, Dennis, & Venkatesh, 2010; Chun, Lim, & Lee, 2016; Jackson, Mun, & Park, 2013; Maillet, Mathieu, & Sicotte, 2015; McKenna, Tuunanen, & Gardner, 2013).

No noteworthy moderation effect was found for either age or culture. Age had a positive moderating effect on the path between the UTAUT2 and the use of mobile device and the path between the constraints and the negotiation were detected but the effect sizes of the moderation were less than a small effect size for both. The cultural moderation effect was not reported due to the lack of statistical differences between the two national groups.

Although, the sub-group analysis of the structural model yielded some different characteristics of the paths. The path between motivation and use of mobile device was only significant among the Canadian hikers whereas it was South Korean hikers' sub-group path coefficient that contributed to the non-significant result in the overall sample analysis. A possible explanation for this outcome may be that the majority of hiking population in South Korea are middle aged people (Choi & Choi, 2017; Schuett, Lee, Choe, & Sim, 2016), and the fact that the South Korean sample's mean age was 10 years older than that of the Canadian sample supports this. Previous studies have suggested that younger and older people hold different mobile technology and ICT use behaviors and preferences (Kubiatko, 2013; Zhou, Rau, & Salvendy, 2014).

On the other hand, the negative effect of the constraints on the outdoor recreation participation and the effect of the constraints on the use of mobile devices were only significant among the South Korean hikers whereas no such effect exists in Canadian participants. The possible explanation for this outcome could be due to Koreans' interdependent self-construal tendency (Markus & Kitayama, 1991; Walker, Deng, & Dieser, 2001; Walker et al., 2005; Walker et al., 2007), mainly explained in Study 1. In other words, South Koreans are, by their nature, sensitive to social norms and others' thoughts toward their behavior. It is possible that the South Korean hikers deal poorly with work and family responsibilities and they become constrained in participating in their hiking activity.

Overall conclusion and practical implications

The three studies included in this dissertation contribute and support the idea that the mobile devices, mostly smartphones, can be helpful tools for hikers' leisure constraints negotiation process for their hiking activities. Study 1 contributed theoretically to the leisure and outdoor recreation research field through empirical testing of the leisure constraints-negotiation theory and its model specification. Study 2 contributed to the UTAUT2 theoretical model by extending the model with an additional construct and exploring the appication of the model in a mountain outdoor recreation context. Study 3 proposed a novel integrated theoretical model, which combined leisure constraints-negotiation theory and the UTAUT2 to empirically investigate mobile devices' impacts on mountain hiking behaviors. The result of Study 3 partially supported the suggested theoretical model. Although this partial support may be a meaningful contribution, further research on this theoretical exploration is needed in the future.

Additionally, outcomes arising from the three studies suggest to outdoor recreation practitioners and ICT industry how they should approach mobile device use in nature-based tourism or outdoor recreation activities. First, the safety functions of the mobile devices and users' expectation of them appeared to be perceived strongly. Second, the use of mobile devices not only during the hiking activity but also before and after hiking help hikers overcome certain barriers against engaging in these activities. Therefore, those factors should be considered when managing parks and protected areas, outdoor recreation programs and facilities, and in developing creative and beneficial mobile technologies.

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Appendices

Measurements' means and standard deviations (CAN)

variables	constructs	items	M	S.D.
Leisure constraints	Intrapersonal constraints	I am not interested in hiking.	1.33	.645
		I am afraid of getting hurt while hiking.	2.27	1.123
		I am afraid of getting lost while hiking.	2.35	1.146
		I cannot access enough information about hiking.	1.84	1.009
		I lack of skills to go hiking.	1.92	1.042
		I lack the physical ability to go hiking.	1.67	.937
	Interpersonal constraints	My companions usually prefer activities other than hiking.	2.72	1.154
		I don't have people to go hiking with.	2.27	1.251
		The people I know live too far away to go hiking with me.	2.18	1.238
	Structural constraints	The fees to go hiking make it too expensive.	1.72	1.009
		The equipment for hiking is too expensive.	2.48	1.254
		I don't have the right equipment.	2.20	1.223
		The place for hiking is too far away.	2.71	1.349
		I lack transportation to hiking sites.	1.94	1.275
		I don't have enough time for hiking.	3.16	1.225
Participation		How long is your hike today? (duration)	2.20	.704
		How often a year do you hike? (frequency)	2.13	.879
Actual use of mobile		How often to do you use your mobile device to	3.44	1.283

device		prepare for a hiking trip?		
		How often do you use your mobile device during hiking?	2.74	1.196
		After hiking, how often do you use your mobile device to share, document and reflect on your most recent hiking trip?	3.19	1.293
negotiation	changing leisure aspiration	I choose hiking routes that are appropriate to my fitness level	4.12	.932
		I sometimes change my hiking location due to trail and weather conditions.	4.03	.912
		I try to visit my favorite hiking place when it is less crowded.	3.94	1.033
	finance	I budget my money to enable more hiking.	2.61	1.169
		I choose locations to hike that are less expensive.	3.19	1.203
	changing interpersonal relations	I participate in hiking activities with people whose age is similar to mine.	3.50	1.250
		I hike with people with similar interests.	4.08	.848
		I actively look for people to hike with.	3.08	1.204
	energy management	I get a lot of rest to prepare for hiking.	2.90	1.141
		When hiking, I try to set the right pace for my fitness level.	4.16	.778
	skill acquisition/ information	I try to improve my hiking skills.	3.88	1.020
		I get advice from experienced hikers.	3.32	1.245
		I seek out information about the best hiking	4.16	.991

		trails.		
		I look for information on transport and access to hiking sites.	3.63	1.230
	time management	I set aside time for hiking.	3.75	1.044
		To ensure that I can hike, I try to plan ahead for things.	4.05	.985
		I get up early or stay up late to increase time for hiking.	3.49	1.179
motivation	achievement	I go hiking to gain a sense of accomplishment.	4.19	.952
		I go hiking to experience excitement/adventure	4.29	.934
		I go hiking to gain a sense of self-confidence.	3.73	1.095
		I go hiking to develop my skills and abilities.	3.72	1.122
	enjoy nature	I go hiking to be close to nature.	4.57	.740
		I go hiking to observe the scenic beauty.	4.73	.668
		I go hiking to enjoy the sounds and smells of nature.	4.57	.789
	escape	I go hiking to get away from the usual demands of life.	4.33	.902
		I go hiking to experience solitude.	3.68	1.237
		I go hiking to experience peace and quiet.	4.42	.890
		I go hiking to unwind.	4.21	.975
	social	I go hiking to be with family or friends.	4.26	.977
		I go hiking to be with people who share my values.	3.74	1.083
		I go hiking to feel connected to others.	3.65	1.188

	health	I go hiking to improve my physical fitness	4.28	.868
		I go hiking to improve my mental well-being.	4.36	.889
UTAUT2	performance expectancy	My mobile device is useful for my hiking	3.83	1.137
		For hiking, my mobile device increases the chance of achieving important things.	3.18	1.285
		Using my mobile device helps accomplish things more quickly for hiking.	3.41	1.234
		I can save time when I use my mobile device for my hiking.	3.41	1.243
	effort expectancy	Learning how to use my mobile device for my hiking is easy	3.89	1.044
		For hiking, my interaction with my mobile device is clear and understandable.	3.79	1.024
		My mobile device is easy to use for hiking.	3.85	1.057
		It is easy for me to become skillful at using my mobile device for hiking.	3.69	1.097
	social influence	People who are important to me think that I should use my mobile device for my hiking.	2.94	1.185
		People whose opinions that I value prefer that I use my mobile device for hiking.	2.79	1.166
			2.96	1.159
	facilitating conditions	I have the necessary data connectivity to use my mobile device for hiking.	3.11	1.392
		I have a sufficient source of electric power to use my mobile device for hiking.	3.66	1.150

		I have the knowledge necessary to use my mobile device for hiking.	4.06	.931
		I feel comfortable using my mobile device for hiking.	3.84	1.059
	hedonic motivation	Using my mobile device for hiking is fun.	3.21	1.195
		Using my mobile device for hiking is enjoyable.	3.29	1.175
		Using my mobile device for hiking is very entertaining.	2.66	1.218
	price	I can save money by using my mobile device for hiking.	2.98	1.145
		Using my mobile device for hiking offers excellent value for my money.	3.25	1.104
		The price of using my mobile device for my hiking is reasonable.	3.55	1.022
		The price of using my mobile device for hiking is affordable.	3.55	1.079
	habit	Using my mobile device for hiking has become habit for me.	3.39	1.380
		I am addicted to using my mobile device for hiking.	2.15	1.200
		I must use my mobile device for hiking.	2.50	1.350
		Using my mobile device for hiking has become routine for me.	3.45	1.245
	safety	Using my mobile device for hiking makes me safer.	3.79	1.186

		I feel comfort when hiking with my mobile device.	3.74	1.174
		My mobile device is useful safety tool for my hiking.	3.81	1.103
		My mobile device helps me identify safe hiking conditions.	3.84	1.028

Measurements' means and standard deviations (KOR)

variables	constructs	items	M	S.D.
Leisure constraints	Intrapersonal constraints	I am not interested in hiking.	2.08	1.102
		I am afraid of getting hurt while hiking.	2.72	1.094
		I am afraid of getting lost while hiking.	2.33	1.090
		I cannot access enough information about hiking.	2.38	.988
		I lack of skills to go hiking.	2.67	.967
		I lack the physical ability to go hiking.	2.48	1.028
	Interpersonal constraints	My companions usually prefer activities other than hiking.	3.33	.957
		I don't have people to go hiking with.	2.44	1.123
		The people I know live too far away to go hiking with me.	2.50	1.069
	Structural constraints	The fees to go hiking make it too expensive.	2.07	.981
		The equipment for hiking is too expensive.	3.00	1.154
		I don't have the right equipment.	2.80	1.176

		The place for hiking is too far away.	2.20	.974
		I lack transportation to hiking sites.	2.06	1.047
		I don't have enough time for hiking.	2.49	1.037
Participation		How long is your hike today? (duration)	2.20	.583
		How often a year do you hike? (frequency)	2.20	1.042
Actual use of mobile device		How often to do you use your mobile device to prepare for a hiking trip?	3.04	1.174
		How often do you use your mobile device during hiking?	2.83	1.080
		After hiking, how often do you use your mobile device to share, document and reflect on your most recent hiking trip?	2.87	1.203
negotiation	changing leisure aspiration	I choose hiking routes that are appropriate to my fitness level	3.83	.728
		I sometimes change my hiking location due to trail and weather conditions.	3.71	.896
		I try to visit my favorite hiking place when it is less crowded.	3.53	1.014
	finance	I budget my money to enable more hiking.	2.66	1.053
		I choose locations to hike that are less expensive.	3.04	.948
	changing interpersonal relations	I participate in hiking activities with people whose age is similar to mine.	3.28	1.033
		I hike with people with similar interests.	3.47	.956
		I actively look for people to hike with.	2.69	.943

	energy management	I get a lot of rest to prepare for hiking.	3.27	.908
		When hiking, I try to set the right pace for my fitness level.	3.78	.797
	skill acquisition/ information	I try to improve my hiking skills.	3.19	.960
		I get advice from experienced hikers.	2.89	1.010
		I seek out information about the best hiking trails.	3.16	1.035
		I look for information on transport and access to hiking sites.	3.32	1.026
	time management	I set aside time for hiking.	2.99	1.051
		To ensure that I can hike, I try to plan ahead for things.	3.19	1.008
		I get up early or stay up late to increase time for hiking.	2.86	1.060
motivation	achievement	I go hiking to gain a sense of accomplishment.	3.45	.965
		I go hiking to experience excitement/adventure	2.97	1.011
		I go hiking to gain a sense of self-confidence.	3.31	.957
		I go hiking to develop my skills and abilities.	2.87	.969
	enjoy nature	I go hiking to be close to nature.	3.89	.878
		I go hiking to observe the scenic beauty.	4.01	.738
		I go hiking to enjoy the sounds and smells of nature.	4.00	.823
	escape	I go hiking to get away from the usual demands of life.	3.86	.938
		I go hiking to experience solitude.	3.27	1.084

		I go hiking to experience peace and quiet.	3.57	1.066
		I go hiking to unwind.	3.41	1.060
	social	I go hiking to be with family or friends.	3.44	1.045
		I go hiking to be with people who share my values.	3.34	1.006
		I go hiking to feel connected to others.	3.21	1.006
	health	I go hiking to improve my physical fitness	4.04	.825
		I go hiking to improve my mental well-being.	4.03	.862
UTAUT2	performance expectancy	My mobile device is useful for my hiking	3.64	.975
		For hiking, my mobile device increases the chance of achieving important things.	3.59	.976
		Using my mobile device helps accomplish things more quickly for hiking.	3.51	1.009
		I can save time when I use my mobile device for my hiking.	3.34	1.021
	effort expectancy	Learning how to use my mobile device for my hiking is easy	3.41	1.019
		For hiking, my interaction with my mobile device is clear and understandable.	3.28	1.028
		My mobile device is easy to use for hiking.	3.43	.978
		It is easy for me to become skillful at using my mobile device for hiking.	3.42	1.016
	social influence	People who are important to me think that I should use my mobile device for my hiking.	3.19	1.045
		People whose opinions that I value prefer that I	3.10	1.009

		use my mobile device for hiking.		
		People who influence my behavior think that I should use my mobile device for hiking.	3.16	.978
	facilitating conditions	I have the necessary data connectivity to use my mobile device for hiking.	3.42	1.025
		I have a sufficient source of electric power to use my mobile device for hiking.	3.50	1.037
		I have the knowledge necessary to use my mobile device for hiking.	3.33	1.041
		I feel comfortable using my mobile device for hiking.	3.46	1.018
	hedonic motivation	Using my mobile device for hiking is fun.	3.29	1.056
		Using my mobile device for hiking is enjoyable.	3.28	1.032
		Using my mobile device for hiking is very entertaining.	2.92	1.041
	price	I can save money by using my mobile device for hiking.	3.08	1.032
		Using my mobile device for hiking offers excellent value for my money.	3.21	.972
		The price of using my mobile device for my hiking is reasonable.	3.32	.918
		The price of using my mobile device for hiking is affordable.	3.28	.986
	habit	Using my mobile device for hiking has become habit for me.	3.14	1.160

		I am addicted to using my mobile device for hiking.	2.49	1.086
		I must use my mobile device for hiking.	2.80	1.177
		Using my mobile device for hiking has become routine for me.	2.93	1.123
	safety	Using my mobile device for hiking makes me safer.	3.33	1.000
		I feel comfort when hiking with my mobile device.	3.47	.976
		My mobile device is useful safety tool for my hiking.	3.55	1.013
		My mobile device helps me identify safe hiking conditions.	3.51	.976

Default Question Block

Mobile device use in hiking experiences study

This survey will be used to improve understanding of how and why park visitors hike in Canada's mountain parks. We are also investigating the role of mobile digital technology plays in people's mountain hiking experiences. We invite you to participate in this study by completing a questionnaire that will take approximately 10–15 minutes. The survey collects no personal identification information. The data you provide will be treated anonymously.

You are under no obligation to participate in this study. Participation is completely voluntary. You are free to withdraw your consent and participation at any time during the completion of the survey, but once completed, you can no longer withdraw the information you have provided.

If you would like to learn more about this study, prior to completing the survey, please click **here** to read the full Informed Consent Information Letter associated with this study. The results of this study will be used in support of

Sung Bum Chun's PhD dissertation. He is a doctoral student of the University of Alberta. Any questions you may have about this study can be sent to Sung Bum Chun (sungbum@ualberta.ca) or his supervisor Dr. Elizabeth Halpenny (halpenny@ualberta.ca).

Please select one of the following options to proceed or end your engagement with this survey:

- ○ Yes - I have read and understood the above information and I want to proceed to the online survey
- ○ No - I do not want to complete the online survey

How many times a year do you hike?

How many times a year would you like to hike?

How familiar are you with this hiking trail as a hiking destination?

- very unfamiliar
- unfamiliar
- neutral
- familiar
- very familiar

How experienced do you think you are at hiking?

	No experience					Very experienced						
	0	10	20	30	40	50	60	70	80	90	100	
Very low												

How long is your hike today? (select only one)

- 1 hour or less
- 1 to 3 hours
- more than a 3 hour day hike
- overnight tirp

Section 1: Barriers to engaging in hiking

Listed below are **<u>constraints</u> commonly** associated with participating **<u>in hiking</u>**. Based on your own experiences, indicate your agreement with the following statements:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
The equipment for hiking is too expensive.	O	O	O	O	O
The place for hiking is too far away.	O	O	O	O	O
The fees to go hiking make it too expensive.	O	O	O	O	O
I am not interested in hiking.	O	O	O	O	O
I lack the physical ability to go hiking.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I lack of skills to go hiking.	O	O	O	O	O
I am afraid of getting hurt while hiking.	O	O	O	O	O
I am afraid of getting lost while hiking.	O	O	O	O	O
I don't have enough time for hiking.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I lack transportation to hiking sites.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I cannot access enough information about hiking.	O	O	O	O	O
I don't have people to go hiking with.	O	O	O	O	O
My companions usually prefer activities other than hiking.	O	O	O	O	O
The people I know live too far away to go hiking with me.	O	O	O	O	O
I don't have the right equipment.	O	O	O	O	O

Section 2: Strategies for overcoming barriers to hiking

Listed below are **negotiation strategies** people often use to overcome hiking constraints. Please indicate how applicable the following statements are for you:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I try to visit my favorite hiking place when it is less crowded.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I choose places to hike where I feel comfortable.	O	O	O	O	O
I try to improve my hiking skills.	O	O	O	O	O
To ensure that I can hike, I try to plan ahead for things.	O	O	O	O	O
I set aside time for hiking.	O	O	O	O	O
I budget my money to enable more hiking.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I participate in hiking activities with people whose age is similar to mine.	O	O	O	O	O
I get a lot of rest to prepare for hiking.	O	O	O	O	O
I seek out information about the best hiking trails.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I sometimes change my hiking location due to trail and weather conditions.	O	O	O	O	O
I choose locations to hike that are less expensive.	O	O	O	O	O
I hike with people with similar interests.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
When selecting a hiking location, I choose routes that would interest potential hiking companions.	O	O	O	O	O
I participate in hiking activities with people of the same gender.	O	O	O	O	O
I organize hiking trips to encourage friends and family to participate in hiking.	O	O	O	O	O
I look for information on transport and access to hiking sites.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
When hiking, I try to set the right pace for my fitness level.	O	O	O	O	O
I actively look for people to hike with.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I get advice from experienced hikers.	O	O	O	O	O
I participate in hiking with people who share a similar cultural-ethnic background as me.	O	O	O	O	O
I get up early or stay up late to increase time for hiking.	O	O	O	O	O
I choose hiking routes that are appropriate to my fitness level	O	O	O	O	O

Section 3: Motivations

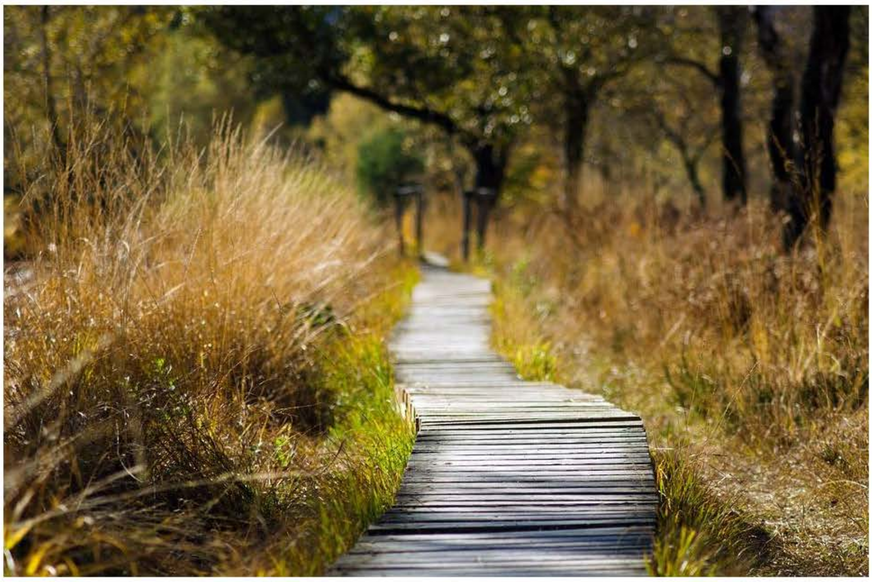
Listed below are statements about **motivations** for participating **in hiking**. Please indicate your level of agreement with each statement:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I go hiking to be with family or friends.	O	O	O	O	O
I go hiking to gain a sense of self-confidence.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I go hiking to experience excitement/adventure.	O	O	O	O	O
I go hiking to develop my skills and abilities.	O	O	O	O	O
I go hiking to improve my physical fitness	O	O	O	O	O
I go hiking to gain a sense of accomplishment.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I go hiking to observe the scenic beauty.	O	O	O	O	O
I go hiking to unwind.	O	O	O	O	O
I go hiking to enjoy the sounds and smells of nature.	O	O	O	O	O
I go hiking to be with people who share my values.	O	O	O	O	O
I go hiking to experience solitude.	O	O	O	O	O
I go hiking to get away from the usual demands of life.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I go hiking to experience peace and quiet.	○	○	○	○	○
I go hiking to improve my mental well-being.	○	○	○	○	○
I go hiking to feel connected to others.	○	○	○	○	○
I go hiking to be close to nature.	○	○	○	○	○



Section 4:
Hiking experiences and digital technology: Before, during and after your hiking trip.

What mobile device do you usually use?

What tasks do you perform most often on your mobile device during hiking? Select up to three (3) uses. If you choose *not* to use a mobile device during hiking, please indicate with a "check mark" in the last option below.

- ☐ trail navigation
- ☐ photo/video capture
- ☐ phone/video calls
- ☐ texting/instant messaging
- ☐ posting to social media
- ☐ looking for information on web sites (non-weather related)
- ☐ weather reports
- ☐ ____ other
- ☐ I don't use a mobile device during hiking

What mobile-device related tasks are <u>most important</u> to you during hiking? Select up to <u>three</u> (3) uses. If you choose *not* to use a mobile device during hiking, please indicate with a "check mark" in the last option below.

- ☐ trail navigation
- ☐ taking photos/videos
- ☐ phone/video calls
- ☐ texting/instant messaging
- ☐ posting to social media
- ☐ looking up information on web sites (non-weather related)
- ☐ weather conditions
- ☐ ____ Other (please describe)
- ☐ GPS tracking
- ☐ travel reservations

☐ travel information search

☐ Connecting with emergency services

☐ I don't use a mobile device when hiking

How often to do you use your mobile device to **prepare** for a hiking trip?

- ○ Never
- ○ Sometimes
- ○ About half the time
- ○ Most of the time
- ○ Always

How often do you use you desktop computer to **prepare** for a hiking trip?

- ○ Never
- ○ Sometimes
- ○ About half the time
- ○ Most of the time
- ○ Always

How often do you use your mobile device **during** hiking?

- Never
- Sometimes
- About half the time
- Most of the time
- Always

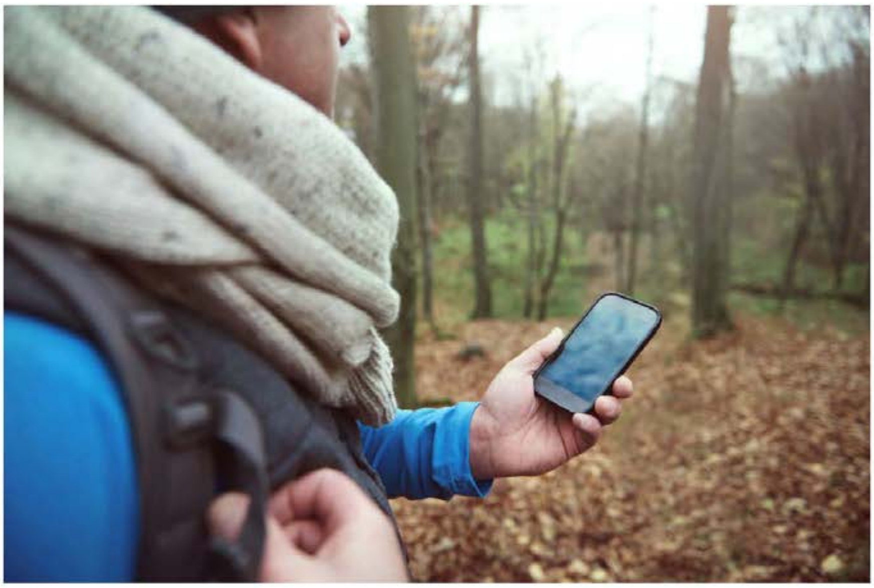
After hiking, how often do you use your mobile device to share, document and reflect on your most recent hiking trip?

- Never
- Sometimes
- About half the time
- Most of the time
- Always

After hiking, how often do you use your desktop computer to share, document and reflect on your most recent hiking trip?

- Never
- Sometimes
- About half the time
- Most of the time

O Always



YOU ARE ALMOST DONE!

How and why do you use your mobile device for hiking experiences? "Hiking experiences" include trip planning, engagement in hiking, and post-hiking experience. State your level of agreement regarding the **use of mobile devices BEFORE, DURING, and AFTER a hiking trip**:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I am addicted to using my mobile device for hiking.	O	O	O	O	O
I feel comfort when hiking with my mobile device.	O	O	O	O	O
For hiking, my interaction with my mobile device is clear and understandable.	O	O	O	O	O
I can save money by using my mobile device for hiking.	O	O	O	O	O
For hiking, my mobile device increases the chance of achieving important things.	O	O	O	O	O
People whose opinions that I value prefer that I use my mobile device for hiking.	O	O	O	O	O
My mobile device helps me identify safe hiking conditions.	O	O	O	O	O
I have a sufficient source of electric power to use my mobile device for hiking.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I can save time when I use my mobile device for my hiking.	O	O	O	O	O
I must use my mobile device for hiking.	O	O	O	O	O
Using my mobile device for hiking is enjoyable.	O	O	O	O	O
Using my mobile device for hiking makes me safer.	O	O	O	O	O
Learning how to use my mobile device for my hiking is easy.	O	O	O	O	O
Using my mobile device for hiking has become habit for me.	O	O	O	O	O
The price of using my mobile device for hiking is affordable.	O	O	O	O	O
Using my mobile device helps accomplish things more quickly for hiking.	O	O	O	O	O
Using my mobile device for hiking is very entertaining.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Using my mobile device for hiking is fun.	O	O	O	O	O
Using my mobile device for hiking has become routine for me.	O	O	O	O	O
My mobile device is useful for my hiking.	O	O	O	O	O
Using my mobile device for hiking offers excellent value for my money.	O	O	O	O	O
I feel comfortable using my mobile device for hiking.	O	O	O	O	O
The price of using my mobile device for my hiking is reasonable.	O	O	O	O	O
I have the knowledge necessary to use my mobile device for hiking.	O	O	O	O	O
People who influence my behavior think that I should use my mobile device for hiking.	O	O	O	O	O

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
People who are important to me think that I should use my mobile device for my hiking.	O	O	O	O	O
My mobile device is easy to use for hiking.	O	O	O	O	O
I have the necessary data connectivity to use my mobile device for hiking.	O	O	O	O	O
My mobile device is useful safety tool for my hiking.	O	O	O	O	O
It is easy for me to become skillful at using my mobile device for hiking.	O	O	O	O	O

Section 5:

Listed below are statements and questions about your **intention and actual use of a mobile device for hiking**.

On this trip, and for future hiking trips I intend to continue using a mobile device for my hiking.

- Extremely unlikely
- Somewhat unlikely
- Neither likely nor unlikely
- Somewhat likely
- Extremely likely

I plan to **actively engage** with my mobile device when hiking. (consult maps, take photos, send messages, make a call)

- Extremely unlikely
- Somewhat unlikely
- Neither likely nor unlikely
- Somewhat likely
- Extremely likely

I plan to **carry** my mobile device when hiking, **but not actively engage** with it. (e.g., receive messages, GPS tracking, emergency use)

- Extremely unlikely
- Somewhat unlikely
- Neither likely nor unlikely
- Somewhat likely
- Extremely likely

When hiking, how often do you **actively engage** with your mobile device (i.e., view and interact with your smartphone screen to read, type, take a photo, make a call)?

- Never
- Sometimes
- About half the time
- Most of the time
- Always

When hiking, how often do you **keep your mobile device nearby and ready to be use but not actively engage with it**? (e.g., using it only for emergency purposes, receiving messages, GPS tracking)

- Never
- Sometimes
- About half the time
- Most of the time
- Always

Section 6: Visitor information.

This section will give us a better understanding of who took part in our study. Like all of the other answers, this information will be kept strictly confidential.

What is your age?

What is your gender?

- Male
- Female
- Other
- I prefer not to answer

What is the highest level of education you have completed?

What was your total household income last year (before taxes)?

Where do you live? Please provide the first three digits of your postal code. If you live outside of Canada, just provide the name of your country.

What ethnic background(s) do you most identify with? (e.g., Japanese, Afro-Canadian, Ukrainian, western European, Scottish).

How many years have you lived in Canada? If you have never lived in Canada (i.e., you live in another country), just indicate 0.

The End

Thank you for your time! Your response has been submitted.

Please click the arrow below to finish and ask surveyors for some refreshment!

등산객의 모바일 기기 사용과 여가제약협상

안녕하세요. 본 연구에 참여해주셔서 감사합니다.
연구 참가 시작 전, 본 연구에 대해 설명 드리도록 하겠습니다.

1. 연구의 배경과 목적
스마트 폰과 같은 모바일 기기는 사람들의 라이프 스타일과 여가 생활을 크게 변화 시켰습니다. 이 설문 조사는 등산객과 국립공원 방문객의 야외 레크리에이션 경험에서 모바일 기기의 역할을 조사하고자 설계되었습니다. 귀하를 본 연구에 초대하고자 합니다. 이 설문 조사에 대한 귀하의 답변은 스마트 폰과 모바일 기기가 산악 기반 야외 레크리에이션에 어떻게 도움이 되는지 이해하는 데 도움이 됩니다. 이 연구의 결과는 연구책임자 전성범의 박사 학위 논문을 작성하는데 사용됩니다.

2. 연구대상자의 참여 기간, 절차 및 소요 시간
본 연구에는 등산을 즐기거나 참여한 경험이 있는 성인 약 200명이 참여할 것입니다. 만일 귀하가 참여의사를 밝혀 주시면 다음과 같은 과정이 진행될 것입니다. 귀하는 10분~15분 정도가 소요되는 약 100문항 분량의 설문지에 답변해 주시게 됩니다. 설문지는 등산 경험에 있어서 모바일기기를 어떻게 활용하고 계신지를 주로 여쭙게 됩니다. 설문조사는 익명으로 이루어지며, 개인을 특정 지을 수 있는 개인 정보는 일체 수집되지 않습니다.

3. 연구대상자에게 예상되는 위험 및 이익
본 연구에 참여하시며 생기는 부작용이나 위험요소는 없습니다. 연구에 참여하심에 있어 직접적인 이익은 없습니다. 다만, 참여하시어 수집되는 자료는 여가 스포츠, 레크리에이션, 그리고 정보통신기술 등의 과학 분야에 귀중한 과학적 데이터가 됨을 알려드립니다.

4. 개인정보보호에 관한 사항
본 연구에서는 개인을 특정할 수 있는 정보(이름, 주민등록번호 등)을 묻지 않습니다. 통계적인 분석을 위해 연령, 성별, 수입 등에 대한 정보를 수집하되, 특정 개인을 추적하여 분석을 진행하지 않을 것입니다. 수집된 데이터는 연구 목적으로만 사용될 것이며 개인의 답변 내용은 기밀로 처리될 것입니다. 연구로부터 얻어진 연구대상자의 설문 답변 자료는 잠금장치가 있는 연구실 및 책상에 보관되며 연구책임자 전성범 만이 접근 가능합니다.

5. 연구 참여에 따른 손실에 대한 보상
본 연구 참가에 따른 직접적인 위험은 없습니다. 연구 참가자가 추가적인 정보나 설명을 원할 경우를 대비하여 담당 연구원의 전화 번호 및 이메일이 제공될 것입니다.

6. 개인정보와 비밀 보장
연구 종료 후 연구관련 자료는 3년간 보관되며 이후 파쇄와 전자파일 삭제 등의 방법으로 폐기될 것이며, 만약 귀하가 참여 중지 및 철회 의사를 밝히는 경우에는 즉시 폐기될 것입니다. 수집된 자료에 대한 통계 분석은 연구실 내에서만 이루어집니다. 이 연구에서 얻어진 개인 정보가 학회지나 학회에 공개 될 때 귀하의 이름과 다른 개인 정보는 사용되지 않을 것입니다. 그러나 만일 법이 요구하면 귀하의 개인정보는 제공될 수도 있습니다. 또한 모니터 요원, 점검요원, 생명윤리위원회는 연구대상자의 비밀보장을 침해하지 않고 관련 규정이 정하는 범위 안에서 본 연구의 실시 절차와 자료의 신뢰성을 검증하기 위해 연구결과를 직접 열람할 수 있습니다.
귀하가 본 연구에 참여하여 설문지를 제출하시는 것은 이러한 사항에 대하여 사전에 알고 있었으며 이를 허용한다는 동의로 간주될 것입니다.

7. 참여 철회 및 중지 보장

참가자는 본 연구 참가 진행 도중 개인이 원할 시에 임의로 중도 참여 포기할 수 있습니다. 참여 포기 시, 개인의 자료 및 정보는 즉시 삭제되며 보관되거나 분석의 대상이 되지 않습니다.

본 연구나 설문에 관해 문의할 사항이 있으시면 아래 연락처로 연락 주시기 바랍니다.

- 연구담당자 연락처
연세대학교 스포츠응용산업학과 대학원 여가학연구실
연구자 전성범 (sbjeon83@yonsei.ac.kr,)

- 연구대상자 권리 정보에 관한 문의처
연세대학교 생명윤리위원회 (02-2123-5143)

1. 본 연구의 연구 목적을 이해하고 연구에 참여하기를 희망합니다.

   한 개의 타원형만 표시합니다.

   ◯ 동의한다

2. 귀하는 1년에 1회 이상 등산에 참여하십니까?

   한 개의 타원형만 표시합니다.

   ◯ 그렇다
   ◯ 아니다

스마트폰으로 답변하실 경우, 가로 화면으로 전환하시길 권장해 드립니다.

I. 등산 경험 정도

3. 1. 1년에 등산을 몇 번 정도 가시나요?

4. 2. 1년에 등산을 몇 번 정도 가길 희망하시나요?

5. 3. 지금 이 등산로에 얼마나 익숙하신가요?

한 개의 타원형만 표시합니다.

- 매우 낯설다
- 낯설다
- 보통이다
- 익숙하다
- 매우 익숙하다

6. 4. 귀하의 등산 활동에 대한 경험 수준을 점수로 매긴다면?

한 개의 타원형만 표시합니다.

0	1	2	3	4	5	6	7	8	9	10
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

7. 5. 오늘 등산 코스는 얼마나 걸리는 코스인가요?

한 개의 타원형만 표시합니다.

- 1시간 이내
- 1시간 ~ 3시간
- 3시간 이상 (당일)
- 야영/대피소 1박 이상

II. 다음은 등산 참여 시 여가 제약에 관한 질문입니다. 귀하의 경험과 생각을 바탕으로 작성해주세요.

8.
행당 한 개의 타원형만 표시합니다.

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우그렇다
나는 등산에 흥미가 없다.					
나는 등산 중에 부상이 우려된다.					
나는 등산 중에 길을 잃을까 우려된다.					
나는 등산에 대해 충분한 정보를 얻을 수 없다.					
나는 등산에 필요한 기술이 부족하다.					
나는 등산에 필요한 신체적/체력적 능력이 부족하다.					
나는 나 자신을 제약하는 심리적 이유로 인해 등산 참여에 어려움을 느낀다.					
내 주변인들이 등산보다는 다른 활동을 더 좋아한다.					
나는 등산을 함께 할 사람이 없다.					
내 지인들은 함께 등산을 가기에는 나와 너무 멀리 떨어져 산다.					
나는 주변사람 또는 가족들과 생각이나 상황이 맞지 않아 등산 참여에 어려움을 느낀다.					
등산 활동에 드는 비용이 너무 비싸다					
등산 용품이 너무 비싸다.					
나는 등산에 적합한 장비가 없다.					
등산을 할 수 있는 장소가 너무 멀다.					
나는 등산 장소로 갈 수 있는 교통수단이 부족하다.					

등산을 할 만한 시간이 부족하다.					
나는 자원이나 환경적 여건이 부족함으로 인해 등산 참여에 어려움을 느낀다.	⬭	⬭	⬭	⬭	⬭

III. 다음은 등산 참여 시 제약협상전략에 관한 질문입니다. 귀하의 경험과 생각을 바탕으로 작성해주세요.

9.
행당 한 개의 타원형만 표시합니다.

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우그렇다
나는 주로 내가 익숙한 곳으로 등산을 간다.	◯	◯	◯	◯	◯
나는 내 체력 수준에 적합한 등산 코스를 선택한다.	◯	◯	◯	◯	◯
나는 등산로와 날씨 상태에 따라 등산 장소를 바꾸기도 한다.	◯	◯	◯	◯	◯
나는 좋아하는 등산 장소를 갈 때 붐비지 않는 시간에 가려고 노력한다.	◯	◯	◯	◯	◯
나는 등산을 더 많이 할 수 있도록 등산 비용에 대한 예산을 책정한다.	◯	◯	◯	◯	◯
나는 비용이 저렴한 곳을 등산 장소로 정하려고 노력한다.	◯	◯	◯	◯	◯
나는 나와 같은 연령대의 사람들과 함께 등산을 한다.	◯	◯	◯	◯	◯
나는 나와 동성의 사람들과 함께 등산을 한다.	◯	◯	◯	◯	◯
나는 나와 비슷한 관심사를 가진 사람들과 등산을 한다.	◯	◯	◯	◯	◯
나는 친구들과 가족의 참여를 유도할 수 있는 등산 계획을 짜려고 노력한다.	◯	◯	◯	◯	◯
등산 장소를 선정할 때, 동행자들의 관심을 끌만한 코스를 고른다.	◯	◯	◯	◯	◯
나는 함께 등산 할 사람을 찾기 위해 적극적으로 노력한다.	◯	◯	◯	◯	◯
나는 등산을 가기 전 충분한 휴식을 취한다.	◯	◯	◯	◯	◯
나는 내 체력 수준에 알맞도록 등산 속도를 조절한다.	◯	◯	◯	◯	◯
나는 등산 실력을 키우려고 노력	◯	◯	◯	◯	◯

한다.					
나는 경험 많은 등산인으로부터 조언을 구하려고 노력한다.					
나는 좋은 등산 코스에 대한 정보를 찾기 위해 노력한다.					
나는 등산 장소로 가는 교통편과 진입 방법에 대한 정보를 찾기 위해 노력한다.					
나는 등산하기 위한 시간을 따로 빼 놓는다.					
나는 등산 활동에 차질이 없도록 미리 계획하고 체계화하려고 노력한다.					
나는 등산 할 시간을 늘리기 위해 일찍 일어나거나 늦게 잔다.					

IV. 다음은 등산 참여 동기에 관련된 질문입니다. 귀하의 경험과 생각을 바탕으로 작성해 주세요.

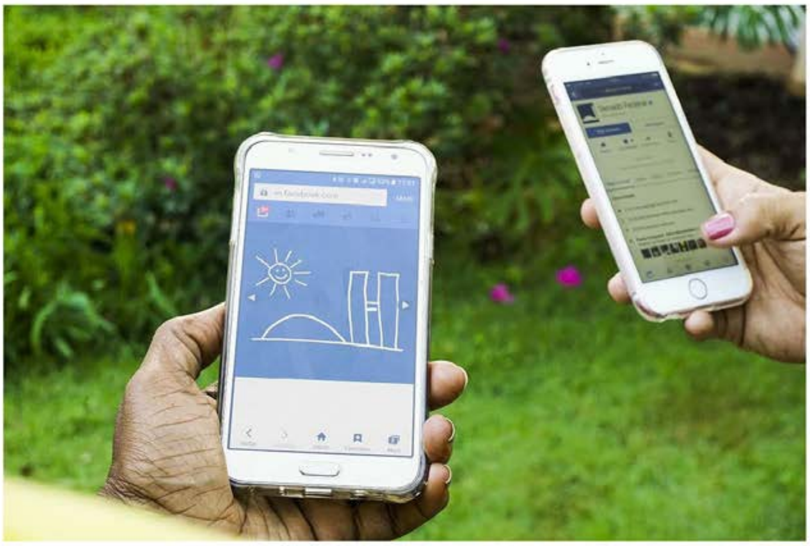
10.

행당 한 개의 타원형만 표시합니다.

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우그렇다
나는 성취감을 느끼기 위해 등산을 한다.					
나는 흥분과 모험을 즐기기 위해 등산을 한다.					
나는 자신감을 얻기 위해 등산을 한다.					
나는 내 등산 기술과 능력을 키우기 위해 등산을 한다.					
나는 자연과 가까워지기 위해 등산을 한다.					
나는 자연의 멋진 경치를 보기 위해 등산을 한다.					
나는 자연의 소리와 냄새를 느끼기 위해 등산을 한다.					
나는 일상의 일들로부터 벗어나기 위해 등산을 한다.					
나는 혼자만의 시간을 갖고자 등산을 한다.					
나는 조용하고 평화로운 시간을 갖고자 등산을 한다.					
나는 긴장을 풀고자 등산을 한다.					
나는 가족이나 친구들과 함께 어울리기 위해 등산을 한다.					
나는 나와 같은 가치관을 공유하는 사람들과 어울리기 위해 등산을 한다.					
나는 사람들과 교감하기 위해 등산을 한다.					
나는 내 신체 건강을 위해 등산을 한다.					

나는 내 정신 건강을 위해 등산을 한다. ◯ ◯ ◯ ◯ ◯

* <참고!> 본 설문지에서 말하는 '모바일 기기'는 가장 널리 쓰이는 스마트폰을 비롯해 태블릿 PC(아이패드), 스마트워치 등을 포함하여 총칭하고 있습니다. 이를 염두에 두시고 다음의 관련 질문에 답변해 주시기 바랍니다.



V. 다음은 등산 활동 전반에 대한 모바일기기 사용과 관련된 질문입니다. 귀하의 경험과 생각을 바탕으로 작성해주세요.

11. 1. 어떠한 모바일 기기를 주로 사용하시나요? (해당하는 것에 모두 V 표시해 주세요.)

해당 사항에 모두 표시하세요.

- [ ] 스마트폰
- [ ] 태블릿PC(아이패드 등)
- [ ] 모바일 기기를 사용하지 않는다

기타: [ ] ______________________

12. 2. 등산을 하는 중에 모바일 기기를 사용한다면 주로 어떤 기능을 사용하시나요? 가장 자주 쓰는 세 가지를 골라 표시해 주세요. 만일 등산 중 모바일 기기를 사용하지 않는다면 '전혀 사용하지 않는다' 선택지 하나에만 표시해 주세요.

해당 사항에 모두 표시하세요.

- [ ] 등산로 탐색 (지도, 네비게이션)
- [ ] 사진/동영상 촬영
- [ ] 전화/영상통화
- [ ] 문자/카톡 등 메시지
- [ ] SNS (페이스북, 인스타 등) 포스팅
- [ ] 웹 검색 (날씨 정보 제외)
- [ ] 날씨 정보 검색
- [ ] 등산 중에는 모바일 기기를 전혀 사용하지 않는다.

기타: [ ] ______________________

13. 3. 등산할 때 가장 중요하다고 생각되는 모바일 기기의 기능은 무엇인가요? 가장 중요하다고 생각되는 세 가지만 표시해 주세요. 만일 등산활동에 모바일 기기를 사용하지 않는다면 '전혀 사용하지 않는다' 선택지 하나에만 표시해 주세요.

해당 사항에 모두 표시하세요.

- [ ] 등산로 탐색 (지도, 네비게이션)
- [ ] 사진/동영상 촬영
- [ ] 전화/영상통화
- [ ] 문자/카톡 등 메시지
- [ ] SNS (페이스북, 인스타 등) 포스팅
- [ ] 웹 검색 (날씨 정보 제외)
- [ ] 날씨 정보 검색
- [ ] 여행 정보 검색
- [ ] 여행 관련 교통 및 숙박 등 예약
- [ ] 긴급통화 또는 비상신고
- [ ] 나의 위치 정보 (GPS)
- [ ] 등산 중에는 모바일 기기를 전혀 사용하지 않는다.

기타: [ ] ______________________

4. 모바일 기기와 컴퓨터 사용에 관련된 다음 문항들에 답변해 주세요.

14. 등산을 가기 위해 준비하는 과정에서 모바일 기기를 얼마나 자주 활용하시나요?

한 개의 타원형만 표시합니다.

- ( ) 전혀 안함
- ( ) 가끔
- ( ) 보통
- ( ) 자주
- ( ) 항상

15. 등산을 가기 위해 준비하는 과정에서 컴퓨터는 얼마나 자주 활용 하시나요?

한 개의 타원형만 표시합니다.

- 전혀 안함
- 가끔
- 보통
- 자주
- 항상

16. 등산하는 도중에 모바일 기기를 얼마나 자주 사용하시나요?

한 개의 타원형만 표시합니다.

- 전혀 안함
- 가끔
- 보통
- 자주
- 항상

17. 등산을 다녀온 이후에, 사진이나 경험담 등을 온라인 공유하기 위한 목적으로 얼마나 자주 모바일 기기를 사용하시나요?

한 개의 타원형만 표시합니다.

- 전혀 안함
- 가끔
- 보통
- 자주
- 항상

18. 등산을 다녀온 이후에, 사진이나 경험담 등을 온라인 공유하기 위한 목적으로 얼마나 자주 컴퓨터를 사용하시나요?

한 개의 타원형만 표시합니다.

- 전혀 안함
- 가끔
- 보통
- 자주
- 항상

* <참고!>본 설문지에서 말하는 '등산 활동'이라고 함은 계획/준비단계(예약 등), 등산할 때(도중), 등산 다녀온 이후를 모두 포함합니다.

19. VI. 다음 모바일 기기 사용 질문에 대해 등산의 계획 단계, 등산 중, 등산 다녀온 이후를 모두 염두에 두고 답변해 주세요.

행당 한 개의 타원형만 표시합니다.

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우 그렇다
모바일 기기는 등산 활동에 유용하다.	⬭	⬭	⬭	⬭	⬭
모바일 기기는 등산 활동을 성공적으로 완수할 수 있게 도와준다.	⬭	⬭	⬭	⬭	⬭
모바일 기기는 등산 활동에 필요한 것들을 더욱 빠르게 완수할 수 있게 해준다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 사용하면 등산 활동 완수에 걸리는 시간이 절약된다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하는 방법을 배우는 것은 쉽다.	⬭	⬭	⬭	⬭	⬭
나는 등산 활동에 대한 모바일 기기 활용법을 명료하게 이해할 수 있다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하는 것은 쉽다.	⬭	⬭	⬭	⬭	⬭
능숙하게 모바일 기기를 등산 활동에 활용하는 것은 나에게 쉬운 일이다.	⬭	⬭	⬭	⬭	⬭
나의 주변사람들(중요한 사람)은 내가 모바일 기기를 등산 활동에 활용해야 한다고 생각한다.	⬭	⬭	⬭	⬭	⬭
나의 행동에 영향을 미치는 사람들은 내가 모바일 기기를 등산 활동에 활용해야 한다고 생각한다.	⬭	⬭	⬭	⬭	⬭
내가 조언을 구하는 사람들은 내가 모바일 기기를 등산 활동에 활용하는 것이 더 좋다고 생각한다.	⬭	⬭	⬭	⬭	⬭
나는 모바일 기기를 등산 활동에 활용하기 충분한 양의 통신 데이터를 운용할 수 있다.	⬭	⬭	⬭	⬭	⬭

나는 모바일 기기를 등산 활동에 활용하기 충분한 전력(배터리 등)을 운용할 수 있다.	⬭	⬭	⬭	⬭	⬭
나는 모바일 기기를 등산 활동에 활용하기 충분한 지식이 있다.	⬭	⬭	⬭	⬭	⬭
나는 모바일 기기를 등산 활동에 활용하는 것이 자연스럽다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하는 것은 재미있다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하는 것은 즐겁다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하는 것은 오락적이다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하면 비용을 절약할 수 있다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하면 더 가치 있는 소비를 할 수 있게 해준다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용할 때 드는 비용은 합리적이다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용할 때 드는 비용은 비싸지 않다.	⬭	⬭	⬭	⬭	⬭
나는 습관적으로 모바일 기기를 등산 활동에 활용한다.	⬭	⬭	⬭	⬭	⬭
나는 모바일 기기를 등산 활동에 활용하는 것에 중독되었다.	⬭	⬭	⬭	⬭	⬭
나는 반드시 모바일 기기를 등산 활동에 사용해야 한다.	⬭	⬭	⬭	⬭	⬭
나는 정기적으로 모바일 기기를 등산 활동에 활용하게 되었다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 등산 활동에 활용하면 더 안전하다.	⬭	⬭	⬭	⬭	⬭
모바일 기기를 갖고 등산 활동을 하면 안심이 된다.	⬭	⬭	⬭	⬭	⬭
등산 활동에 있어 모바일 기기는	⬭	⬭	⬭	⬭	⬭

유용한 안전 도구이다.					
모바일 기기는 등산 활동을 위한 안전한 환경을 판단할 수 있게 도와준다.	⬭	⬭	⬭	⬭	⬭

VII. 다음의 등산활동에 대한 모바일 기기 사용 의도와 실제 사용에 관련된 질문에 답해주세요.

20. 1. 나는 이번 산행을 비롯한 앞으로의 등산 활동에서도 모바일 기기를 지속적으로 사용할 것이다.

한 개의 타원형만 표시합니다.

⬭ 전혀 그렇지 않다
⬭ 그렇지 않다
⬭ 보통이다
⬭ 그렇다
⬭ 매우 그렇다

21. 2. 나는 앞으로 등산할 때 모바일 기기를 적극적으로 활용할 계획이다. (지도/네비네이션, 사진촬영, 문자메시지, 전화 등)

한 개의 타원형만 표시합니다.

⬭ 전혀 그렇지 않다
⬭ 그렇지 않다
⬭ 보통이다
⬭ 그렇다
⬭ 매우 그렇다

22. 3. 나는 등산할 때 모바일 기기를 소지하고 있을 계획이지만, 직접적으로 들고 사용하지는 않을 계획이다. (위치추적기능, 비상상황 대비, 메시지 수신만을 위한 목적)

한 개의 타원형만 표시합니다.

- 전혀 그렇지 않다
- 그렇지 않다
- 보통이다
- 그렇다
- 매우 그렇다

23. 4. 등산 하는 중에 얼마나 자주 직접적으로 모바일 기기를 사용하시나요? (스마트폰 스크린 보기, 터치 하기, 사진 촬영, 전화통화 등)

한 개의 타원형만 표시합니다.

- 전혀 안함
- 가끔
- 보통
- 자주
- 항상

24. 5. 등산 하는 중에 모바일 기기를 지니고는 있지만 직접적으로 사용하지 않는 경우가 어느 정도 되시나요? (위기상황 대비, 위치정보공유, 메지시 받기 등만을 위한 목적)

한 개의 타원형만 표시합니다.

- 전혀 안함
- 가끔
- 보통
- 자주
- 항상

VIII. 이 마지막 파트는 인구통계학적 질문입니다. 개인을 특정 지을 수 없는 질문들이므로 개인정보유출에 대한 걱정 없이 작성하시면 됩니다.

25. 1. 귀하의 연령은? (만 연령)

26. 2. 귀하의 성별은?

한 개의 타원형만 표시합니다.

- 남성
- 여성
- 기타
- 답변하고 싶지 않다

27. 3. 귀하의 학력은?

한 개의 타원형만 표시합니다.

- 중졸 이하
- 고졸
- 전문대학 졸업
- 대학교 중퇴/재학/휴학
- 대학교 졸업
- 대학원 이상

28. 4. 귀하 가정의 작년 총 가계소득 수준은?

한 개의 타원형만 표시합니다.

- 2,000만원 미만
- 2,000만원~4,999만원
- 5,000만원~6,999만원
- 7,000만원~9,999만원
- 1억원~1.5억원
- 1.5억 이상
- 답변하고 싶지 않다

29. 5. 어느 지역에 거주하시나요? (구, 동 등)

30. 6. 귀하의 등산 경력은?

한 개의 타원형만 표시합니다.

- 1년 미만
- 1년~3년 미만
- 3년~6년 미만
- 6년 이상