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Psychological Restoration through Indoor and Outdoor Leisure Activities

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Abstract

Numerous studies have shown that participation in leisure activities not only prevents disease and improves physical health but also benefits mental health by reducing anxiety. The aim of this study was to explore the effects of various leisure activities on anxiety reduction and attention restoration. Five activities were chosen and classified into two groups: indoor and outdoor. Taiwanese students ($N=203$) each undertook one of the five activities. Results showed that: (a) moderate leisure activity, such as walking, was the best outdoor activity for improving mental health; (b) chatting also reduced anxiety and restored attention; and (c) surfing the Internet and exercising both failed to significantly improve mental health. In addition, outdoor activities were better for restoring attention compared to indoor activities.

Keywords: *recreation therapy; stress reduction; attention restoration; psychological benefit*

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Leisure activities have long been considered beneficial for mental and physical health (Coleman & Iso-Ahola, 1993). They help prevent diseases, improve physical health, and benefit mental health by reducing anxiety and depression and increasing positive emotions (Godbey, 2003; Kelly, 1996). Warburton, Nicol, and Bredin (2006) suggested that people are now experiencing greater physical and mental problems due to a decline in undertaking activities in natural environments. Duvall (2011) indicated that regularly engaging in outdoor activities can improve physical and mental health. Other studies have also indicated that participating in moderate-intensity leisure activities (e.g., walking) can effectively reduce psychological anxiety and improve mood (Fox, 1999; Roe & Aspinall, 2011; Scully, Kremer, Meade, Graham, & Dudgeon, 1998). In addition, studies have shown that contact with nature can provide physical and psychological benefits. For example, horticultural therapy has been shown to mediate emotional, cognitive, and sensory motor function improvement, and increase social participation, health, well-being, and life satisfaction (Jarrott, Kwack, & Relf, 2002; Smith, 1998). Time spent outdoors (e.g., in a garden) has also been shown to facilitate restoration for older adults compared to time spent indoors (Ottoosson & Grahn, 2005). The majority of the above-mentioned studies focused on the physical and psychological benefits of outdoor activities. Few studies have explored the effects of indoor activities on mental health.

Since the Taiwanese government implemented the two-day weekend policy in 2001, people have had more time for leisure. Because of rapid urban developments, leisure activities have become more diverse, and people are increasingly engaging in indoor activities to relax and reduce stress, such as shopping online, chatting over the Internet, and indulging in high tea in cafés. The 2005 survey of leisure of Taiwanese citizens conducted by National Statistics, R.O.C. indicated that the indoor activities most commonly performed by Taiwanese citizens were as follows: watching TV (68.3%), surfing the Internet (11.3%), chatting (8.1%), and listening to music or reading (5.7%). The most popular outdoor activities were as follows: visiting friends (33.4%), walking (18.4%), exercising and playing ball games (15.7%), and going to the cinema (12.7%) (Wang, Tang, Chen, & Tseng, 2011). Another survey also indicated an annual increase in the number of people performing indoor activities (e.g., surfing the Internet), whereas the number of people participating in outdoor activities has decreased each year, especially among the younger population (Directorate General of Budget, Accounting and Statistics, 2005). Instead of participating in outdoor activities, most young people prefer to surf the Internet at home when they have free time; this affects their physical and mental health (Beutel, Braehler, Glaesmer, Kuss, Wolfling, & Muller, 2011; Velezmoro, Lacefield, & Roberti, 2010). Therefore, this study investigated whether different types of leisure activities affect mental health differently; and if so, whether indoor or outdoor activities vary in the way they benefit mental health.

Literature Review

Psychological Restoration Theory

Attention restoration theory (ART) (Kaplan & Kaplan, 1989) and stress reduction theory (SRT) (Ulrich, 1984; Ulrich, Simons, Losito, Fiorito, Miles, & Zelson, 1991) are two of the key frameworks commonly used to understand restorative environments. ART focuses on the cognitive aspects and emphasizes that engaging in activities in the natural environment can restore direct attention (Kaplan, 1995). Kaplan and Kaplan (1989) argued that direct attention requires mental concentration. As shown in Kaplan's study, visiting an appealing natural environment can enable an individual to maintain or restore her or his direct attention. Results of several

other studies also supported ART (Hartig, Evans, Jamner, Davis, & Gärling, 2003; Hartig, Mang, & Evans, 1991; Taylor, Kuo, & Sullivan, 2002; Tennessen & Cimprich, 1995; Wells, 2000) regarding the effects of the natural environment on attention restoration. On the other hand, SRT places greater emphasis on the emotional and physical aspects; that is, a natural environment helps reduce stress (Ulrich et al., 1991). Ulrich suggested that when people are exposed to a natural environment, their attention is redirected to the landscape, alleviating their negative thoughts. Additionally, they replace their negative emotions with positive emotions and thereby restore the balance of their physicality (Hansmann, Hug, & Seeland, 2007). Ulrich's SRT focuses on the positive effects of emotion in terms of reduced negative feelings and increased positive emotions (Ulrich, 1979; Ulrich & Addoms, 1981). Rambo (1984) suggested that anxiety, one of the explicit forms of stress, was the most common stressor and stimulator. Spielberger (1966) stated that anxiety is a person's reaction to a stressful scenario after identifying, evaluating, and analyzing the level of stress; it is an immediate and current emotional state a person experiences when anxious or nervous. This process is known as reaction to state anxiety. Numerous studies have reported that interacting with nature can reduce stress (Knopf, 1987; Ulrich et al., 1991). For example, looking out a window that has a nature view has been found to reduce stress and increase positive emotions (Leather, Pyrgas, Bealle, & Lawrence, 1998).

Indoor Leisure Activities

Survey results have indicated that the most common strategies teenagers use to cope with stress or negative emotions are chatting, listening to music, and sleeping (Department of Health, Executive Yuan, R.O.C., 2003). Martin, Nancarrow, Parker, Phelps, and Regen (2005) stated that chatting can reduce interpersonal distance, and empathizing with others and listening to people's stories and experiences can distract individuals from their anxiety and relieve stress. Similarly, Cooper Marcus, and Barnes (1999) reported that the most important factor that reduced people's stress and pain when doing gardening was chatting and sharing their lives with friends whom they had not interacted with previously. Thus, chatting can be considered as one of the easiest and most convenient ways to relieve stress effectively.

Nowadays, teenagers can participate in numerous leisure activities, with surfing the Internet being among the most popular. In the U.S., a survey on Internet use was conducted with 2,054 students from 27 colleges (Velezmoro et al., 2010). The results showed that 74% of the students used the Internet for 4 or more hours per week, and 19% of them used the Internet for over 12 hours per week. Most studies regarding Internet addiction issues have focused on problems such as increased psychological stress (Misra & Castillo, 2004), physical problems caused by using the Internet, and how students' academic achievements were affected (Ng & Jeffery, 2003). However, these studies were primarily exploring the negative effects of long-term Internet use, whereas in this study, we focus on short-term and appropriate Internet use. We hypothesize that appropriate Internet use can relieve students' stress and restore their attention; an issue that has received limited attention previously.

Outdoor Leisure Activities

Regarding outdoor activities, studies have suggested that walking in nature provides better recovery compared to walking in urban areas (Hartig et al., 2003). Hartig et al. (1991) examined how three exercises affected a person's restoration of mental health. Three groups of participants were instructed to perform assigned exercises for 40 minutes, including walking in wilderness, walking in cities, and engaging in passive leisure activities (e.g., listening to music, reading magazines), and then their mental state was examined. The results showed that the mental health of

those who walked in wilderness was better restored. Furthermore, other studies have suggested that physical activities can reduce symptoms of anxiety, improve self-esteem (Godbey, 2003; Windaele et al., 2007), and reduce stress (Asztalos et al., 2009). People who engaged in green exercises (outdoors and indoors with pleasant rural scenes) expressed lower levels of anxiety (Pretty, Peacock, Hine, Sellens, South, & Griffen, 2007), reduced negative emotions (Harte & Eifert, 1995), and more effective restorative experiences (Pretty, Peacock, Sellens, & Griffen, 2005).

The American Horticultural Therapy Association (AHTA) defined horticultural therapy as the use of plants and gardens to promote human health and well-being and to provide people with wisdom, society, affection, and physiological benefits (Söderback, Söderström, & Schlander, 2004). Lewis (1995) and Pretty (2004) found that tending to and interacting with plants and nature can arouse inherent human reactions. Gardening activities were found to be associated with an increase in happiness and life satisfaction (Lewis & Mattson, 1988; Milligan, Gatrell, & Bingley, 2004), reduction in stress and fear (Dijkstra, Pieterse, & Pruyn, 2008), and increases in work motivation and performance (Kam & Siu, 2010). Additionally, horticultural therapy comprises four aspects: intelligence, sociability, affection, and physical condition, and can benefit even healthy people (Relf, 1973). This study attempts to understand how gardening activities affect and benefit people's psychological state.

Study Aim

The aforementioned literature showed that both indoor and outdoor leisure activities have positive effects on mental health. This research study aims to explore whether both outdoor and indoor leisure activities have mental benefits in terms of anxiety reduction and attention restoration. A better understanding of the way in which anxiety is reduced can have a wide application in helping people with stress or mental issues. Therefore, the purpose of the study was to examine whether indoor and outdoor activities vary in their ability to restore attention and to reduce the level of anxiety. In light of the limited research into the mental benefits of indoor activities, the study also aims to explore the effects of various indoor leisure activities on anxiety reduction and attention restoration. In response to the two main purposes, the hypotheses to be tested in this study are: (1) participants' anxiety is reduced by participating in various leisure activities; (2) participants' attention is restored after participating in various leisure activities; (3) outdoor leisure activities reduce anxiety to a greater extent than indoor activities; and (4) outdoor leisure activities benefit attention restoration more compared to indoor activities. The selection of leisure activities is explained in the next section.

Method

Participants and Activities

College students were recruited to participate in our study. To recruit volunteers to participate in indoor and outdoor activities, announcements were posted around campus. Volunteers selected one activity and subsequently participated in the survey. They were required to complete consent forms and were not allowed to participate in more than one activity. The surveys were conducted according to participants' chosen activity. Although 219 participants were initially enrolled, after eliminating incomplete data, the valid sample consisted of 203. Of this total, 103 (50.7%) were females, and their ages ranged from 18 to 26 years ($M = 19.7$ years, $SD = 1.25$). The number of participants assigned to each activity ranged from 37 to 48 (Table 1). The *t*-test analysis result for samples from various activities showed no significant difference in terms of gender.

Table 1*Demographic Information of Participants in Five Activities (N = 203)*

Types of activity	Male	Female
	N (%)	N (%)
Surfing the Internet	19 (51.4)	18 (48.6)
Chatting	14 (35.9)	25 (64.1)
Walking	17 (43.6)	22 (56.4)
Exercising	31 (77.5)	9 (22.5)
Gardening	19 (39.6)	29 (60.4)

The selection of leisure activities for the study gave consideration to the social background of the study site—Taiwan. Based on the survey of leisure of Taiwanese citizens in 2005, the indoor activities that Taiwanese people favor are watching TV, surfing the Internet, and chatting with friends (Wang et al., 2011). However, “watching TV” was not included in the research because of the variation by viewers’ preferences for varying types of programs, which would have impeded the results of the experiments. The preferred outdoor activities for Taiwanese people are visiting friends, walking, exercising, and playing ball games (Wang et al., 2011). These outdoor activities were included in the research except “visiting friends,” which was excluded because it can take place both indoors and outdoors. In addition, gardening, an activity including more interaction with natural environments, was included as an alternative outdoor activity in this study. This decision was made based on the fact that numerous previous studies have shown that gardening provides physical and psychological benefits (Kam & Siu, 2010; Kaplan & Kaplan, 1989; Relf, 1973; Söderback et al., 2004). Additionally, several studies have found that exercise and walking in natural environments are beneficial to mental health (Asztalos et al., 2009; Hartig et al., 2003).

To explore the effects of both indoor and outdoor leisure activities, five types of activities were selected. Indoor activities included surfing the Internet and chatting; outdoor activities included walking, exercising, and gardening. We applied an equal stimulation time for each activity to ensure the presence of psychological reactions; the duration of each activity was 30 minutes. Detailed descriptions of each activity are provided below.

Surfing the Internet. The participants were allowed to freely play online games or visit websites, including social networking websites such as Facebook, Twitter, or MSN messenger.

Chatting. Participants were instructed to remain in their classrooms and to chat with their classmates or friends they knew well.

Walking. A 2- to 3-km-long route was designed on campus, and a group of college students were invited to walk the route. Before beginning the activity, we explained to the students that they would encounter beautiful scenery, such as experimental flower farms, Chinese herb fields, and fountains.

Exercising. Participants were instructed to play basketball, volleyball, or tennis in an outdoor space.

Gardening. The students were instructed to engage in outdoor farming activities, such as planting vegetables and flowers, weeding, fertilizing plants, mixing fertilizer, trimming and pruning trees, and tidying farm tools.

Measures

Attention restoration. The Necker Cube Pattern Control (NCPC) test is designed to measure one's capacity to direct mental effort (Kaplan, 1995). The NCPC has been a sensitive measure in previous studies of restorative environments (Hartig et al., 1991, 2003; Taylor et al., 2002; Tennessen & Cimprich, 1995). It uses a wire-frame cube named after the Swiss crystallographer Louis Necker (1832) who observed that cubic shapes repeatedly reverse their perceived orientation. The number of reversals over a set period of time is counted and used to determine attention capacity. Participants received a drawing of the cube and were told that their perspective on the cube would shift back and forth. Once they were familiar with this property, they looked at the Necker cube and counted on the sheet every time the pattern reversed. We counted the number of reversals that occurred during two consecutive 30-second hold periods during which the participant was to focus on one pattern for as long as possible. We used the average number of reversals across the two hold periods as the dependent variable in our analyses. The score is a measure of the proportionate reduction in perceived reversals. Thus, lower scores are indicative of more directed attention capacity.

State anxiety. State anxiety is a person's response to a stressful scenario after realizing and evaluating the level of stress; thus, state anxiety is considered one type of stress. The Chinese version of State-Trait Anxiety Inventory (STAI) is based on Spielberger's State-Trait Anxiety Inventory, which consists of two 20-item subscales wherein the State Anxiety Inventory (STAI-S) measures a temporary condition, and the Trait Anxiety Inventory (STAI-T) measures the long-standing quality of trait anxiety (Chung & Long, 1984). This study only used the subscale of state anxiety with a 4-point rating scale, that is, (1) *not at all*, (2) *a little*, (3) *somewhat*, and (4) *very much*. The State Anxiety Inventory (SAI) included 10 negative items; however, the scores were adjusted for statistical analysis, thus, the items with higher scores reflected a higher level of state anxiety and stress. The scores ranged between 20 for the lowest to 80 for the highest.

Procedure

Data collection took place between late April and early June when the weather is typically clear and warm (thus controlling for the potential confound of discomfort brought about by bad weather). To ensure that each participant accumulated a certain level of fatigue, all the tests in this study were conducted in the afternoon after each student had attended classes for at least 2 hours in the morning. Additionally, before participating in the activity, the participants were required to attend a one-hour class to maximize their fatigue before participating in the pretest (to complete NCPC and the State Anxiety Inventory) (Hartig & Staats, 2006). Following their participation in the stimulating activity for 30 minutes, participants were required to complete the posttest and provide their demographic information (Figure 1). Each participant was given a gift as a token of appreciation for completing the activity and tests.

Results

Effects of Activities on Anxiety Reduction

The mean values of the anxiety level showed that nearly every activity scored 40 in the pretest while the exercise group scored the lowest score of 39.03 (Table 2). A dependent *t*-test was performed to examine the difference in the anxiety reduction between pretest and posttest caused by the five activities. The results showed that the effects of chatting ($t=5.55$) and walking ($t=6.10$) were significant ($p<.001$), which showed that these two activities were helpful in reduc-

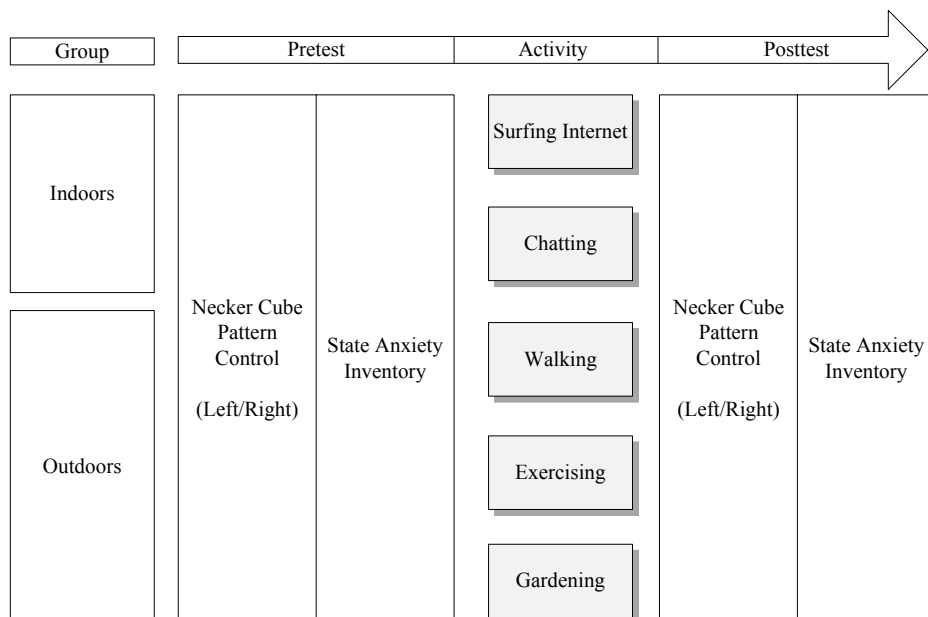


Figure 1. Research Procedure

ing psychological stress. Regarding effect sizes, Cohen (1988) stated that “there is a certain risk in inherent in offering conventional operational definitions for those terms for use in power analysis in as diverse a field of inquiry as behavioral science” (p. 25). Cohen’s d can be interpreted in terms of the percent of nonoverlap of the pretest’s scores with those of the posttest. The effect sizes of the current study are based on uncontrolled (within-group design) correlated measures. As a consequence, the effect sizes were computed on the basis of the formula adapted for correlated design developed by Dunlap, Cortina, Vaslow, and Burke (1996, p. 171, Eq. (3)): $d = t_c [2(1 - r)/n]^{1/2}$. Based on Cohen’s (1998) benchmarks, effect sizes can be categorized into small ($d = .0-.2$), medium ($d = .3-.5$), and large ($d = .6-.8$). The activities of chatting and walking had large effect sizes (Table 2).

Table 2

Variance Analysis of the Effects of Activities on Anxiety

	Pretest		Posttest		df	t	r	d
	M	SD	M	SD				
Surfing the Internet	40.27	11.77	37.73	12.22	36	1.57	.66	.21
Chatting	42.51	9.72	36.00	7.63	38	5.55***	.67	.72
Walking	44.74	11.07	37.13	10.39	38	6.10***	.74	.70
Exercising	39.03	10.50	37.48	11.73	39	1.10	.68	.14
Gardening	41.00	10.85	38.75	10.39	47	1.72	.64	.21

Note: Higher score represents a higher level of state anxiety and stress. The scores ranged from 20 to 80. *** $p < .001$.

Effects of Activities on Attention Restoration

When assessing the effect of each activity on attention restoration, we found that participants reported four or more Necker cube reversals during the pretest for all activities except chatting. A dependent *t*-test was performed to identify the impacts of the five activities on the attention restoration. The results showed that the effects of chatting ($t=5.12$), walking ($t=5.37$), and gardening ($t=5.19$) were all significant ($p<.001$) (Table 3). All of these activities reduced the number of reversals reported for the Necker cube, indicating that the activities were useful for attention restoration. Cohen's *d* effect sizes were also computed to provide an estimate of the change in the magnitude of attention restoration score between pre- and post-treatment. Regarding effect size measurements, one indoor and two outdoor activities benefited attention restoration; however, the Cohen's *d* values for chatting was medium, and walking and gardening had the large effect sizes. These findings indicate that adequately participating in physical exercise, especially activities, such as walking and gardening, enabled people to restore their attention. By contrast, surfing the Internet and exercising did not have significant effects.

Table 3

Variance Analysis of the Effects of Activities on Attention Restoration

	Pretest		Posttest		<i>df</i>	<i>t</i>	<i>r</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Surfing the Internet	5.31	3.41	4.65	3.53	36	1.36	.64	.19
Chatting	3.86	2.15	2.81	1.98	38	5.12***	.81	.51
Walking	4.04	2.58	2.51	1.80	38	5.37***	.73	.63
Exercising	4.13	2.05	3.58	2.65	39	1.65	.62	.23
Gardening	5.33	4.00	2.53	1.91	47	5.19***	.37	.84

Note: Lower scores are indications of more directed attention capacity. *** $p < .001$.

Effects of Indoor and Outdoor Activities on Anxiety Reduction and Attention Restoration

To test hypothesis three (i.e., outdoor leisure activities reduce anxiety to a greater extent than indoor activities), a mixed model two-way ANOVA was employed. The independent variables were the different environments (i.e., indoor and outdoor) and time (i.e., pretest and posttest) while the level of anxiety was the dependent variable. Simple main effect would be used if the interaction between variables was significant. The results showed that the interaction between environments and time was not significant ($F(1, 201) = 0.49$). The result of simple main effect showed that the environments were not significant ($F(1, 201) = 0.16$). This indicated that the environment had no significant influence on the reduction of anxiety. The result of the simple main effect for time was significant ($F(1, 201) = 40.74, p<.001$) with the partial eta squared value as .17. This revealed a significant difference in the reduction of anxiety between pre- and post-treatment (Table 4).

For the test of hypothesis four (i.e., outdoor leisure activities benefit attention restoration more compared to indoor activities), the results of the mixed model two-way ANOVA showed that the interaction between environment and time was significant ($F(1, 201) = 4.66, p<.05$). The partial eta squared value of .02 suggested a very small effect size, and the observed power was .575 (Table 4). As a result of the significant the interaction between environment and time,

Table 4

Two-Way ANOVA of the Effects of Environment (Indoor and Outdoor) and Time (Pretest and Posttest) on Anxiety and Attention Restoration

Source	SS	df	MS	F	p	partial η^2
<i>Anxiety</i>						
Environment	29.55	1	29.55	0.16	.693	.00
Time	1620.48	1	1620.48	40.74	.000	.17
Environment \times Time	19.33	1	19.33	0.49	.486	.01
Error	7994.15	201	39.77			
<i>Attention restoration</i>						
Environment	17.595	1	17.60	1.48	.225	.01
Time	156.12	1	156.12	43.51	.000	.18
Environment \times Time	16.73	1	16.73	4.66	.032	.02
Error	721.22	201	3.59			

we ignored the two main effects and examined the simple main effects of the environment. The findings revealed a significant difference ($F(1, 201) = 3.53, p = .02$) in the attention restoration between the outdoor activities ($M_{\text{posttest}} = 2.85$) and the indoor activities ($M_{\text{posttest}} = 3.70$). This indicates that the attention restoration of the outdoor activities was lower than the indoor activities. The means and standard deviations for the anxiety reduction and attention restoration measure as the factors are presented in Table 5.

Table 5

Descriptive Statistics of Anxiety and Attention Restoration

	Pretest		Posttest	
	M	SD	M	SD
<i>Anxiety</i> ^a				
Indoors	41.42	10.75	36.84	10.09
Outdoors	41.53	10.97	37.85	10.77
<i>Attention restoration</i> ^b				
Indoors	4.57	2.91	3.70	2.97
Outdoors	4.56	3.11	2.85	2.18

Note: ^a Higher score represents a higher level of state anxiety and stress. The scores ranged from 20 to 80. ^b Lower scores are indications of more directed attention capacity.

Discussion

The results of this study suggest that leisure activities are beneficial for mental health in terms of anxiety reduction and attention restoration. For the indoor activities, chatting with good friends can significantly reduce anxiety and restore attention. On the other hand, walking is the only outdoor activity that can both reduce anxiety and facilitate attention restoration

while gardening is only beneficial to attention restoration. The benefits of outdoor activities like walking and gardening can be the result of close contact with nature. Pretty (2004) believed that the natural environment provides numerous benefits to humans. Thus, he proposed three levels of engagement with nature, namely viewing nature, being in the presence of nature, and participation or interaction with nature. Any of these levels qualifies as interacting with nature and provides a positive influence, which enables people to cope with stress and improve their attention (Mackay & Neill, 2010). Interestingly, although gardening did restore attention, our analysis showed that gardening did not reduce anxiety. There are two possible explanations for this finding. First, gardening for a short time can restore a person's attention, but a longer period of engagement is required to reduce anxiety. Second, this activity was performed in a high-temperature environment; thus, the participants may have felt irritated and, consequently, their anxiety did not decrease.

Two other activities were examined in this study - surfing the Internet and exercising - both of which failed to significantly improve mental health. This study has found that surfing the Internet is not helpful for anxiety reduction or attention restoration; no benefit was obtained despite being conducted for 30 minutes. This study also found that although many participants used Facebook or Plurk to chat with friends or to shop online, these activities failed to relieve their anxiety or restore their attention. Regarding the insignificant effect of exercising, this may be associated with exercise intensity. Previous studies have indicated, for example, that adequate engagement in physical exercise can help people to retain good physical function, but high-intensity exercise can harm mental health (Asztalos et al., 2009; Fox, 1999). In contrast with low-intensity exercises, high-intensity exercise, such as ball games, are less effective for reducing anxiety.

In summary, outdoor activities can better restore people's attention compared to indoor activities. This finding is in line with Hug, Hartig, Hansmann, Seeland, and Hornung (2009) as well as our study hypothesis four, which suggests that outdoor leisure activities benefit attention restoration more than indoor activities. Most outdoor activities occur in an environment with green surroundings. People can thus restore their attention by engaging with the natural environment by undertaking these outdoor activities. This finding was consistent with the perspective of ART (Kaplan & Kaplan, 1989), which suggests that direct attention can be restored through interaction with green space and nature. A significant decrease in the level of anxiety before and after participating in the activities showed that undertaking these activities had positive effects on mental health. Moreover, research has shown that time spent outdoors is associated with increased physical activity (McCurdy, Winterbottom, Mehta, & Roberts, 2010). These findings reinforce both the physical and mental benefits along with undertaking outdoor activities in a natural setting, which should be encouraged for the wellbeing of people.

The environment (i.e., indoors and outdoors) was assessed as an independent variable, with no significant interaction on anxiety being found. The results can be compromised by the following factors: (a) the limited sample size of approximately 40 people for each activity involved with the study; and (b) the limited types of leisure activities. Therefore, it is desirable for future research to include a wider variety of leisure activities as well as to increase the sample size.

In addition, this study identified a number of significant phenomena. The finding was that chatting benefits include the reduction of anxiety and restoration of attention. Most previous studies have agreed that chatting provides psychological benefits; for example, social interaction through gardening (Barnicle & Midden, 2003); and walking and chatting with friends in natural environments (Hansmann et al., 2007). However, these positive benefits resulted from outdoor

activities whereas the venue of the activity—chatting—in our study was in an indoor environment. These findings indicated that chatting in both indoor and outdoor environments can improve psychological health. It would be interesting to explore the difference in mental benefits of chatting between indoor and outdoor settings. Nevertheless, despite the positive benefits of the indoor activity (e.g., chatting), outdoor activities should be encouraged for their physical benefits. Moreover, chatting with friends or family while taking a walk outdoors may maximize the benefits of mental health. This can enhance the relationship between friends or family members as well as facilitate people's physical health. These long-term benefits have been attributed to physical activity and opportunities for restoration (Sugiyama, Leslie, Giles-Corti, & Owen, 2008).

Study Limitations

This study's aim was to explore the impact that indoor and outdoor activities have on psychological benefits. However, certain limitations exist including the following: First, the sample was comprised of students. Although previous studies have shown that no differences exist between using students and non-students as samples (Evan & Wood, 1980), the inferences that can be made remain limited given the lack of generalizability. Because the samples were not randomly assigned, the results also showed limitations regarding inferences about general populations. Second, the sample size was small. However, because leisure activities and health are universal issues, careful consideration is required when making inferences regarding general populations. Third, because of time and financial limitations, only two indoor and three outdoor activities were selected for inclusion in this study. The types of leisure activities conducted in Taiwan vary considerably, increasing the difficulty of examining each activity and, thus, limiting inferences regarding activities. The results cannot be applied to every indoor or outdoor activity. The final limitation resulted from cultural differences. This study examined the indoor and outdoor activities performed in Taiwan, which may differ from those of other countries. Therefore, inferences regarding other countries must be carefully considered.

Future Research Recommendations

Three suggestions are provided regarding future research: First, we recommend future studies include regular demographic factors of a non-student population, such as age, occupation, and socioeconomic background. By examining these factors, we can further understand how different types of leisure activities affect people's mental health and then use the findings to promote national health and quality of life. Second, future studies should include diverse indoor and outdoor leisure activities, such as watching movies, reading, working out, bicycling, and picnicking. Finally, this study investigated how regular leisure activities affect mental health; the results suggest that the varied stimuli of these activities lead to different levels of anxiety reduction and attention restoration. The results indicate that compared to indoor activities, outdoor leisure activities have a more optimal effect on attention restoration. Thus, we recommend that future studies examine the concept of "leisure activity dose" by categorizing outdoor activities based on their various intensities and durations, and investigating their influence on mental health.

Practical Implications

The rapid development of modern science and technology has resulted in the increasing emergence of an indoor entertainment industry (e.g., Internet cafés, KTVs, and online shops). The consequent lack of outdoor activity participation in natural environments has led to people's growing inability to relieve daily life pressures and stresses through nature (Beutel et al., 2011; Leung, 2007; Velez-moro et al., 2010). Participating in leisure activities improves people's quality

of life, establishes social links, and provides multiple opportunities for study, promoting personal development. Participating in leisure activities as a family can also increase the affection, cohesion, and well-being among family members. These results provide a reference of the effectiveness of various leisure activities, enabling people to engage in activities that are beneficial to their physical and mental health. Additionally, people can use these findings to plan their leisure activities or education classes. In summary, the results encourage people to engage in outdoor leisure activities. Finally, finding can be used by schools when planning coursework or the curriculum to introduce leisure activities to improve students' attention, relieve stress, increase their learning motivation and performance, and improve their mental health.

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