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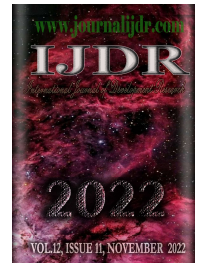
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RESEARCH ARTICLE

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## THE STUDY OF LEISURE ACTIVITIES DURING THE COVID-19 PANDEMIC—A CASE STUDY OF TAIWAN

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### ABSTRACT

The Covid-19 pandemic has significantly changed the lives of most people all over the world, including working style, social communication, consumption behaviour, leisure activities, and so forth. Physical health and mental health are important to human life. Many people get physical health and mental health by doing leisure activities, including outdoor and indoor activities; therefore, leisure activities play an essential role for life. The purpose of the study was to understand subjects' opinions about the COVID-19 pandemic on leisure activities. An online survey was carried out to investigate Taiwanese people's viewpoints on leisure activities during the COVID-19 pandemic. The researchers designed a leisure activities questionnaire and analysed the data by SPSS 17.0. There were 547 valid samples in the study. The researchers found that over three-fourths of the subjects were from southern Taiwan. About one-fourth of the subjects were students, and near one-fifth of the subjects were teachers and government employees. More than 40% of the subjects thought that the COVID-19 pandemic had negative effects on leisure activities while as one-fourth positive effects. Prior to the COVID-19 pandemic, over 30% of the subjects took over seven hours to do leisure activities in a week while as post the COVID-19 pandemic over 30% of the subjects less than one hour.

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## INTRODUCTION

The COVID-19 pandemic has appeared almost three years in the world. It makes the world change in many ways, including economy, politics, society, transportation, health care, and so forth. People have to change to live. Leisure activities are also influenced by the COVID-19 pandemic because of wearing mask, social distance, and quarantine. Due to the restrictions to the time and places, leisure activities may have some differences before and after the COVID-19 pandemic. Dal & Bulgan (2021) found that healthcare workers who had higher leisure time satisfaction during the COVID-19 pandemic had higher job motivation. Leisure activities play an essential role in people's life, and they provided opportunities to meet life values and needs (Brajša-Žganec *et al.*, 2011). Leisure activities often make people feel joyful, relaxed, and comfortable. Engaging in leisure activities can promote mental and physical health; therefore, people do a variety of leisure activities outdoors and indoors to stay healthy. Pearson (1998, 2008) also showed that leisure time satisfaction had a positive effect on psychological health and excessive workload negatively affected leisure time satisfaction. During the COVID-19 pandemic, our indoor and outdoor leisure activities have profoundly

changed. Therefore, the researchers would like to explore people's viewpoints and the differences about leisure activities during the COVID-19 pandemic.

**Research Purpose and Questions:** The researchers would like to know if there were any changes between subject's gender, residence, age, occupation, leisure preference, and leisure time before and after the COVID-19 pandemic. Therefore, there were some research questions based on research purpose as the following.

- Are there any differences between subject's gender and leisure preference, leisure time, leisure change before and after the COVID-19 pandemic?
- Are there any differences between subject's residence and leisure preference, leisure time, leisure change before and after the COVID-19 pandemic?
- Are there any differences between subject's age and leisure preference, leisure time, leisure change before and after the COVID-19 pandemic?
- Are there any differences between subject's occupation and leisure preference, leisure time, leisure change before and after the COVID-19 pandemic?

- What are subject's leisure preference before, after the COVID-19 pandemic, and the end of the COVID-19 pandemic?

## Literature Review

The outbreak of COVID-19 pandemic has led to changes for many people, including work styles, emotions, activities, and so forth. Experiencing the impact of COVID-19 pandemic, a lot of people have to change their ways of living. Leisure activities play an important role in our daily lives. Outdoor or indoor leisure activities can make people rest, relax, enjoy life, and get mental or physical health. Lim & Pranata (2021) showed that COVID-19 caused the suspension of sporting events, closure of gyms and fitness centers, and restrictions on outdoor activities. During the COVID-19 pandemic, people were forced to stay at home and have to stop most outdoor leisure activities. However, staying at home instead of going outside makes many people feel anxious and depressed. Though Morgan *et al.* (2021) showed that leisure activities may mitigate depressive symptoms, during the COVID-19 pandemic, outdoor leisure activities were reduced dramatically and people were forced to change their patterns of leisure activities. Luckily, Siani & Marley (2021) found that the engagement with virtual reality (VR) activities could have a positive impact on users' mental and physical wellbeing during the lockdown period, and they also found that VR use has significantly increased during the lockdown period for most participants. Therefore, the researchers would like to know how people in Taiwan change their leisure activities during the COVID-19 pandemic.

**Gender and leisure activities:** Many studies explored the relationship between gender and leisure activities. Morgan *et al.* (2021) found that certain leisure activities could be helpful or unhelpful depending on gender. Some studies showed that there were no significant differences, such as Yoo (2022) who found that there were no significant differences between male and female participants in terms of satisfaction with leisure activities, and Li *et al.* (2020) who showed that there was no significant relationship between gender and involvement of leisure. However, some studies showed there were significant differences, like Auhuber *et al.* (2019) who revealed that girls with lower SES spent less time on outdoor leisure activities, Brajša-Žganec *et al.* (2011) who indicated the pattern of leisure activities somewhat varied across different gender groups, Ho (2022) who found that Taiwanese urban women participating in social leisure activities were driven by extrinsic and intrinsic motivations, Kim *et al.* (2020) who indicated females adopted more health prevention behaviors than males, Öztürk *et al.* (2019) who found female teachers differed from male ones in the attitude of leisure in the cognitive sub-dimension, Philipp (1998) who showed that males had a much stronger association in their ranked scores than females, Rees (2018) who found that there was evidence of differences in children's leisure activities according to gender, Saito *et al.* (2015) who showed that men were more likely to engage in going out, Yerkes *et al.* (2020) who revealed that there were association between gender and the extent to which free time was used to relax, and Yoo (2022) who showed that women had more positive attitudes toward leisure. From the above literature reviews, most studies found that there were some differences between gender and the patterns, time, or attitude of leisure activities. In this study, the researchers would make some discussions with the previous studies.

**Residence and leisure activities:** In a country, not all people live in the city or countryside. Perhaps they have different chances to do different leisure activities. Little studies focused on the relationship between residence and leisure activities. Li *et al.* (2020) showed that significant differences were found between residence and leisure involvement. In this study, the researchers would like to know whether there were any differences between residence and leisure activities in Taiwan.

**Age and leisure activities:** Leisure activities play an important role in people's lives, however, whether different age groups have different leisure preference needs to be discussed more. Some studies revealed that there were some differences between age and leisure activities. For example, Brajša-Žganec *et al.* (2011) showed that the pattern of

leisure activities somewhat varied across different age groups. Moreover, Finkel *et al.* (2018) indicated that the women had more cognitive/sedentary leisure activities than the men after about the age of 70 years, and both of them declined in physical leisure activities, and variance in leisure activities increased with age; men demonstrated more variance in social activities and women in physical activities. In addition, Li *et al.* (2020) showed that age had significant impacts on leisure involvement; Liu *et al.* (2022) revealed changes in leisure activities varied by age; Rees (2018) also found that there was evidence of differences in children's leisure activities according to age. However, Öztürk *et al.* (2019) indicated that no significant relationship was found between age and leisure activities. In other words, the relationship between age and leisure activities has not been consistent in studies. In this study, the researchers would like to find whether there are any differences between age and leisure activities in Taiwan, especially before and after the COVID-19 pandemic.

**Occupation and leisure activities:** Is there any relationship between occupations and leisure activities? Some occupations need more physical strength, but others do not. Some leisure activities also need more physical strength, while others do not. Studies indicated that there was association between occupations and leisure activities, like Cusatis & Garbarski (2019) who found that those who were in manufacturing/agriculture, unemployed, and other occupations were accessing physical activity significantly more than those in managerial/professional occupations, Cha (2018) who revealed that differences were found in outdoor leisure time use by occupations between younger and older groups, and Kirk & Rhodes (2011) who showed that occupation category/status was directly associated with leisure-time physical activity (LTPA), with white-collar/professionals showing the highest LTPA compared to blue-collar workers. When occupational physical activity (OPA) was measured, a positive association with LTPA was found. Some studies also found that work hours appeared to have a negative threshold effect on leisure-time physical activity (Burton & Turrell, 2000; Kirk & Rhodes, 2011). Some studies showed that there was no significance between occupations and leisure activities, like Dorfman & Kolarik (2005) who indicated that little relationship between occupations and leisure activities, and Li *et al.* (2020) who showed that occupation had no significant impact on leisure involvement. Therefore, in this study, the researchers would like to know whether there are any differences between occupations and leisure activities, and compare the findings with those of the previous studies.

**Emotions and the COVID-19 pandemic:** The outbreak of novel Coronavirus (COVID-19) has led to negative emotions of fear and agony in the general population. Rothe, *et al.* (2021) found that a greater number of emotions worsened significantly for children and adolescents as well as adults without mental health conditions during the COVID-19 pandemic. Negative emotions lead to a rise in anxiety, depression, and mental illness. Renström & Bäck (2021) showed that in the past, negative emotions have often been lumped together, regardless of their specific nature, including anger, fear, anxiety, resentment, and sadness (Brader & Marcus, 2013). In fact, fear is an unpleasant emotion that we have when we are frightened or worried by something dangerous that is happening or might happen. Anxiety is an uncomfortable feeling of nervousness or worry about something that is happening or might happen in the future. Resentment is a feeling of someone else gaining from – or being the source of – one's own, or one's in-group's, loss of recognition and status (Kemper, 2001; 2011). Those negative emotions are bad for our health. COVID-19 is a kind of new potentially fatal virus; therefore, many people feel uncertain, anxious, resentful, and fearful, even suffer from depression because they feel unhappy and without hope for the future. Some studies found that under the COVID-19 pandemic, most people were forced into social isolation and quarantine at home, and many of these individuals were being physically inactive and mentally stressed, like depression and anxiety (Brooks *et al.*, 2020; Durnová & Mohammadi, 2021; Fofana, *et al.*, 2020; Hoof, 2020; Johnson, *et al.*, 2020; Keller *et al.*, 2022; Lim & Pranata, 2021; Qiu *et al.*, 2020; Sloan, *et al.*, 2021; Swinton, 2020), emotional fatigue, insomnia (Brooks *et al.*, 2020), uncertainty (Johnson, *et al.*, 2020),

hopelessness and helplessness (Fofana, *et al.*, 2020), and resentment (Durnová & Mohammadi, 2021). Moreover, Fofana, *et al.* (2020) also found that healthcare workers were at high risk of catching long-term mental health problems. That is, negative emotions appear more often during the COVID-19 pandemic. Based on the above literature reviews, most studies found that the COVID-19 pandemic had a variety of negative impacts on people, such as fear, anxiety, depression, resentment, and so forth. In this study, the researchers would like to know how people in Taiwan react to the COVID-19 pandemic.

**Leisure activities and the COVID-19 pandemic:** Leisure activities play an essential role in maintaining good mental health (Verghese *et al.*, 2006). The COVID-19 pandemic makes people's lives different, including leisure activities (Kinczel & Müller, 2022; Randler *et al.*, 2020). Many studies found that leisure activities significantly reduced during the COVID-19 pandemic (Gammon & Ramshaw, 2021; Liu *et al.*, 2022; Rice *et al.*, 2020; Takiguchi *et al.*, 2022). Liu *et al.* (2022) revealed that leisure needs, satisfaction, and social activities were statistically significant predictors of stress-related growth during the pandemic. However, Kang *et al.* (2022) found that some South Korea residents proactively overcome leisure constraints, and their leisure activities were not reduced but slightly modified (e.g. watching baseball games online vs. at a ballpark) or even increased (e.g. camping). In this study, the researchers would like to understand how people in Taiwan feel about the change of leisure activities before and after the COVID-19 pandemic, and their opinions about the impact of COVID-19 on leisure activities.

## METHODOLOGY

**Subjects:** In the study, there were valid 547 subjects from Taiwan, including 186 males and 361 females. From September 2021 to October 2021, the subjects were volunteers to take part in the survey online.

**Research Instrument:** The researchers first designed a questionnaire with 13 items (4 background items, 9 leisure items, as Appendix) and then invited three experts to make sure the description of items was clear, appropriate, and unambiguous. Data collection was conducted online due to limitations in carrying out face-to-face surveys during the COVID-19 pandemic. Then, the researchers employed the questionnaire as the research instrument and obtained 547 valid samples including 186 males and 361 females in the study. The data were collected by online from September 19<sup>th</sup> to October 8<sup>th</sup>, 2021.

## RESULTS AND DISCUSSION

**Descriptive Statistics:** After analysing the data, the researchers found that over 65% of the subjects were female and from southern Taiwan (as Table 1). Moreover, near half of the subjects were 45-65 years old (43.5%). In addition, over one-fourth of the subjects were students (26.7%). It seemed that young people are more willing to conduct a survey online. What's more, near one-fifth of the subjects were teachers and government employees (18.8%). Generally speaking, they have fixed working time, therefore, it is much easier for them to conduct a survey online.

**Inferential Statistics:** In order to answer research question 1 (*Are there any differences between subject's gender and leisure preference, leisure hour, leisure change before and after the COVID-19 pandemic?*), a chi-square test of independence was performed to examine the variables (as Tables 2-8). From Table 2, 60 of the 547 (11.0%) outdoor-type participants, 153 of the 547 (28.0%) indoor-type participants, 312 of the 547 (57.0%) both-type participants and 22 of the 547 (4.0%) other-type participants exhibited the leisure preference before the COVID-19 pandemic. The chi-square test revealed that leisure preference and gender before the COVID-19 pandemic were not statistically significantly associated ( $\chi^2_{3df}=2.726$ ,  $p=.436$ ).

**Table 1. Demographic Characteristics and Backgrounds of the Subjects (N=547)**

Category	n	%
Gender		
Female	361	66.0%
Male	186	34.0%
Residence		
Northern	60	11.0%
Central	37	6.8%
Southern	418	76.4%
Eastern	24	4.4%
Offshore	5	0.9%
Others	3	0.5%
Age		
under 18	65	11.9%
18-25	98	17.9%
25-35	42	7.7%
35-45	84	15.4%
45-55	128	23.4%
55-65	110	20.1%
over 65	20	3.7%
Occupation		
Student	146	26.7%
Soldier/teacher/government employee	103	18.8%
Hospitality industry	15	2.7%
Construction industry	5	0.9%
Manufacturing	28	5.1%
Agriculture, Forestry, Fisheries and Animal Husbandry	4	0.7%
Industry and commerce	28	5.1%
Service industry	40	7.3%
Retiree	44	8.0%
Medical Staff	42	7.7%
Others	92	16.8%

**Table 2. The Chi-Square Test between Gender and Leisure Preference before the COVID-19 Pandemic**

	Male		female		total
	n	%	n	%	
Outdoors	25	41.7%	35	58.3%	60
Indoors	46	30.1%	107	69.9%	153
out/in	108	34.6%	204	65.4%	312
Others	7	31.8%	15	68.2%	22
Total	186	34.0%	361	66.0%	547

$$\chi^2_{3df}=2.726, p=.436$$

**Table 3. The Chi-Square Test between Gender and Impact of COVID-19 on Leisure Activities**

	male		female		total
	n	%	n	%	
yes	158	33.1%	320	66.9%	478
no	25	43.1%	33	56.9%	58
neutral	3	27.3%	8	72.7%	11
total	186	34.0%	361	66.0%	547

$$\chi^2_{2df}=2.554, p=.279$$

From Table 3, 478 of the 547 (87.4%) participants showed that the COVID-19 pandemic had impact on their life, 58 of the 547 (10.6%) no impact and 11 of the 547 (2.0%) no specific response. The chi-square test revealed that the impact of COVID-19 on leisure activities and gender were not statistically significantly associated ( $\chi^2_{2df}=2.554$ ,  $p=.279$ ).

**Table 4: The Chi-Square Test between Gender and Leisure Activity Change after the COVID-19 Pandemic**

	male		female		total
	n	%	n	%	
obvious	136	33.5%	270	66.5%	406
obscure	47	36.7%	81	63.3%	128
neutral	3	23.1%	10	76.9%	13
total	186	34.0%	361	66.0%	547

$$\chi^2_{2df}=1.158, p=.560$$

From Table 4, 406 of the 547 (74.2%) participants showed that leisure activity change after the COVID-19 pandemic was obvious, 128 of the 547 (23.4%) obscure and 13 of the 547 (2.4%) no specific response. The chi-square test revealed that leisure activity change and gender were not statistically significantly associated ( $\chi^2_{2df}=1.158, p=.560$ ).

**Table 5. The Chi-Square Test between Gender and Leisure Time per Week before the COVID-19 Pandemic**

male			female		
	n	%	n	%	total
under 1 hour	6	16.2%	31	83.8%	37
1-3 hours	29	29.0%	71	71.0%	100
3-5 hours	37	29.8%	87	70.2%	124
5-7 hours	40	37.7%	66	62.3%	106
above 7 hours	74	41.1%	106	58.9%	180
total	186	34.0%	361	66.0%	547

$\chi^2_{4df}=12.001, p=.017$

From Table 5, 37 of the 547 (6.8%), 100 of the 547 (18.3%), 124 of the 547 (22.7%), 106 of the 547 (19.4%), and 180 of the 547 (32.9%) participants exhibited the leisure time per week before the COVID-19 pandemic was under one hour, 1-3 hours, 3-5 hours, 5-7 hours, and above 7 hours, respectively. The chi-square test revealed that the leisure time per week before the COVID-19 pandemic and gender were statistically significantly associated ( $\chi^2_{4df}=12.001, p=.017$ ). And female subjects spent more leisure time per week before the COVID-19 pandemic than male ones.

**Table 6. The Chi-Square Test between Gender and Leisure Time per Week after the COVID-19 Pandemic**

male			female		
	n	%	n	%	total
under 1 hour	51	30.0%	119	70.0%	170
1-3 hours	42	26.1%	119	73.9%	161
3-5 hours	32	40.0%	48	60.0%	80
5-7 hours	26	51.0%	25	49.0%	51
above 7 hours	35	41.2%	50	58.8%	85
total	186	34.0%	361	66.0%	547

$\chi^2_{4df}=15.491, p=.004$

From Table 6, 170 of the 547 (31.1%) subjects, 161 of the 547 (29.4%), 80 of the 547 (14.6%), 51 of the 547 (9.3%), and 85 of the 547 (15.5%) exhibited the leisure time per week after COVID-19 pandemic was less than one hour, 1-3 hours, 3-5 hours, 5-7 hours and above 7 hours, respectively. The chi-square test revealed that the leisure time per week after the COVID-19 pandemic and gender were statistically significantly associated ( $\chi^2_{4df}=15.491, p=.004$ ). And female subjects spent less leisure time per week after the COVID-19 pandemic than male ones.

**Table 7. The Chi-Square between Gender and the Experience about Leisure Activity Change after the COVID-19 Pandemic**

male			female		
	n	%	n	%	total
like	14	30.4%	32	69.6%	46
dislike	147	35.6%	266	64.4%	413
neutral	25	28.4%	63	71.6%	88
total	186	34.0%	361	66.0%	547

$\chi^2_{2df}=1.953, p=.377$

From Table 7, 46 of the 547 (8.4%) participants showed that they liked the change of leisure activity after the COVID-19 pandemic, 413 of the 547 (75.5%) disliked, and 88 of the 547 (16.1%) no specific response. The chi-square test revealed that the experience of leisure activity change and gender were not statistically significantly associated ( $\chi^2_{2df}=1.953, p=.377$ ). No matter the subjects were male or female, most of them disliked the change of leisure activities after the COVID-19 pandemic.

**Table 8. The Chi-Square Test between Gender and Effect of COVID-19 on Leisure Activity**

	male		female		
	n	%	n	%	total
positive	48	31.2%	106	68.8%	154
negative	93	39.7%	141	60.3%	234
neutral	45	28.3%	114	71.7%	159
total	186	34.0%	361	66.0%	547

$\chi^2_{2df}=6.290, p=.043$

From Table 8, 154 of the 547 (28.2%) participants showed that the effect of COVID-19 on leisure activity was positive, 234 of the 547 (42.8%) negative, and 159 of the 547 (29.1%) neutral. The chi-square test revealed that COVID-19-effect and gender were statistically significantly associated ( $\chi^2_{2df}=6.290, p=.043$ ). And the effect of COVID-19 had more significant effect on female subjects than male ones. In short, in this study, the researchers found that gender and leisure preference, the impact of COVID-19 on leisure activities, leisure activity change, and the experience of leisure activity change were not statistically significantly associated. On the other hand, gender and leisure time before and after the COVID-19 pandemic, and COVID-19-effect were statistically significantly associated. More specifically, female subjects spent more leisure time before the COVID-19 pandemic, which was consistent with the study of Hotlermann *et al.* (2012), but spent less leisure time after the COVID-19 pandemic than male ones; the effect of COVID-19 had more significant effect on female subjects than male ones. The results were consistent with the studies of Kim *et al.* (2020) and Kim and Cho (2020). And Saito *et al.* (2015) found that differences in the levels of social and leisure activities among gender. In order to answer research question 2 (*Are there any differences between subject's residence and leisure preference, leisure hour, leisure change before and after the COVID-19 pandemic?*), a chi-square test was employed to identify whether there were any differences between subject's residence and leisure preference, leisure hour, leisure change before and after the COVID-19 pandemic (as Tables 9-15).

**Table 9. The Chi-Square Test between Residence and Leisure Preference before the COVID-19 Pandemic**

	outdoors	indoors	out/in	others	total
northern	10(16.7%)	8(13.3%)	41(68.3%)	1(1.7%)	60
central	9(24.3%)	11(29.7%)	17(45.9%)	0(0%)	37
southern	38(9.1%)	128(30.6%)	232(55.5%)	20(4.8%)	418
eastern	3(12.5%)	6(25%)	15(62.5%)	0(0%)	24
offshore	0(0%)	0(0%)	5(100%)	0(0%)	5
others	0(0%)	0(0%)	2(66.7%)	1(33.3%)	3
total	60	153	312	22	547

$\chi^2_{15df}=32.666, p=.005$

From Table 9, 60 of the 547 (11.0%) outdoor participants, 153 of the 547 (28.0%) indoor participants, 312 of the 547 (57.0%) outdoor-indoor participants and 22 of the 547 (4.0%) other-type participants exhibited the leisure preference before the COVID-19 pandemic. The chi-square test revealed that leisure preference and residence before the COVID-19 pandemic were statistically significantly associated ( $\chi^2_{15df}=32.666, p=.005$ ). Most of the subjects did outdoor and indoor leisure activities before the COVID-19 pandemic, no matter where they lived.

**Table 10. The Chi-square Test between Residence and Impact of COVID-19 on Leisure Activities**

	yes	no	neutral	total
northern	54(90.0%)	6(10.0%)	0(0%)	60
central	35(94.6%)	2(5.4%)	0(0%)	37
southern	361(86.4%)	46(11.0%)	11(2.6%)	418
eastern	21(87.5%)	3(12.5%)	0(0%)	24
offshore	5(100%)	0(0%)	0(0%)	5
others	2(66.7%)	1(33.3%)	0(0%)	3
total	478	58	11	547

$\chi^2_{10df}=7.050, p=.721$

From Table 10, 478 of the 547 (87.4%) participants showed that the COVID-19 pandemic had impact on their leisure activities, 58 of the 547 (10.6%) no impact, and 11 of the 547 (2.0%) no specific response. The chi-square test revealed that the impact of COVID-19 on leisure activities and residence were not statistically significantly associated ( $\chi^2_{10df}=7.050, p=.721$ ).

**Table 11. The Chi-square Test between Residence and Leisure Activity Change after the COVID-19 Pandemic**

	obvious	obscure	neutral	total
northern	50(83.3%)	10(16.7%)	0(0%)	60
central	27(73.0%)	9(24.3%)	1(2.7%)	37
southern	304(72.7%)	102(24.4%)	12(2.9%)	418
eastern	19(79.2%)	5(20.8%)	0(0%)	24
offshore	4(80.0%)	1(20.0%)	0(0%)	5
others	2(66.7%)	1(33.3%)	0(0%)	3
total	406	128	13	547

$$\chi^2_{10df}=5.136, p=.882$$

From Table 11, 406 of the 547 (74.2%) participants showed that leisure activity change after the COVID-19 pandemic was obvious, 128 of the 547 (23.4%) obscure and 13 of the 547 (2.4%) no specific response. The chi-square test revealed that leisure activity change and residence were not statistically significantly associated ( $\chi^2_{10df}=5.136, p=.882$ ).

**Table 12. The Chi-square Test between Residence and Leisure Time per Week before the COVID-19 Pandemic**

	under 1 hour	1-3 hours	3-5 hours	5-7 hours	above 7 hours	total
northern	1 (1.7%)	8 (13.3%)	12 (20.0%)	10 (16.7%)	29 (48.3%)	60
central	1(2.7%)	4 (10.8%)	9 (24.3%)	8 (21.6%)	15 (40.5%)	37
southern	32 (7.7%)	84 (20.1%)	100 (23.9%)	82 (19.6%)	120 (28.7%)	418
eastern	2 (8.3%)	3 (12.5%)	2 (8.3%)	5 (20.8%)	12 (50.0%)	24
offshore	0(0%)	1 (20.0%)	1 (20.0%)	1 (20.0%)	2 (40.0%)	5
others	1 (33.3%)	0(0%)	0 (0%)	0 (0%)	2 (66.7%)	3
total	37	100	124	106	180	547

$$\chi^2_{20df}=25.755, p=.174$$

From Table 12, 37 of the 547 (6.8%) participants, 100 of the 547 (18.3%) participants, 124 of the 547 (22.7%) participants, 106 of the 547 (19.4%) participants, and 180 of the 547 (32.9%) participants exhibited the leisure time before the COVID-19 pandemic was under one hour, 1-3 hours, 3-5 hours, 5-7 hours, and over 7 hours, sequentially. The chi-square test revealed that the leisure time per week before the COVID-19 pandemic and residence were not statistically significantly associated ( $\chi^2_{20df}=25.755, p=.174$ ).

**Table 13. The Chi-square Test between Residence and Leisure Time per Week after the COVID-19 Pandemic**

	under 1 hour	1-3 hours	3-5 hours	5-7 hours	above 7 hours	total
northern	19 (31.7%)	14 (23.3%)	13 (21.7%)	8 (13.3%)	6 (10.0%)	60
central	6 (16.2%)	13 (35.1%)	11 (29.7%)	3 (8.1%)	4 (10.8%)	37
southern	139 (33.3%)	122 (29.2%)	53 (12.7%)	35 (8.4%)	69 (16.5%)	418
eastern	4 (16.7%)	11 (45.8%)	2 (8.3%)	3 (12.5%)	4 (16.7%)	24
offshore	1 (20.0%)	1 (20.0%)	1 (20.0%)	2 (40.0%)	0 (0%)	5
others	1 (33.3%)	0 (0%)	0 (0%)	0 (0%)	2 (66.7%)	3
total	170	161	80	51	85	547

$$\chi^2_{20df}=34.454, p=.023$$

From Table 13, 170 of the 547 (31.1%) participants, 161 of the 547 (29.4%) participants, 80 of the 547 (14.6%) participants, 51 of the 547 (9.3%) participants, and 85 of the 547 (15.5%) participants

exhibited the leisure time per week after the COVID-19 pandemic was under one hour, 1-3 hours, 3-5 hours, 5-7 hours, and over 7 hours, respectively. The chi-square test revealed that the leisure time per week after the COVID-19 pandemic and residence were statistically significantly associated ( $\chi^2_{20df}=34.454, p=.023$ ). The subjects from the northern and southern Taiwan spent less than one hour, and the ones from central and eastern Taiwan spent 1-3 hours per week on leisure activities after the COVID-19 pandemic.

**Table 14. The Chi-square between Residence and the Experience about Leisure Activity Change after the COVID-19 Pandemic**

	like	dislike	neutral	total
Northern	1(1.7%)	54(90.0%)	5(8.3%)	60
Central	1(2.7%)	30(81.1%)	6(16.2%)	37
Southern	40(9.6%)	306(73.2%)	72(17.2%)	418
Eastern	3(12.5%)	17(70.8%)	4(16.7%)	24
Offshore	0(0%)	5(100%)	0(0%)	5
Others	1(33.3%)	1(33.3%)	1(33.3%)	3
Total	46	413	88	547

$$\chi^2_{10df}=15.691, p=.109$$

From Table 14, 46 of the 547 (8.4%) participants showed that they liked the change of leisure activity after the COVID-19 pandemic, 413 of the 547 (75.5%) disliked and 88 of the 547 (16.1%) no specific response. The chi-square test revealed that the experience of leisure activity change and residence were not statistically significantly associated ( $\chi^2_{10df}=15.691, p=.109$ ). No matter where the subjects lived, most of them disliked the change of leisure activity after the COVID-19 pandemic.

**Table 15. The Chi-square Test between Residence and Effect of COVID-19 on Leisure Activity**

	positive	negative	neutral	total
Northern	16(26.7%)	33(55.0%)	11(18.3%)	60
Central	5(13.5%)	25(67.6%)	7(18.9%)	37
Southern	121(28.9%)	162(38.6%)	135(32.3%)	418
Eastern	10(41.7%)	8(33.3%)	6(25.0%)	24
Offshore	1(20.0%)	4(80.0%)	0(0%)	5
Others	1(33.3%)	2(66.7%)	0(0%)	3
Total	154	234	159	547

$$\chi^2_{10df}=23.822, p=.008$$

From Table 15, 154 of the 547 (28.2%) participants showed that COVID-19 pandemic had positive effect on their leisure activity, 234 of the 547 (42.8%) negative effect and 159 of the 547 (29.1%) neutral effect. The chi-square test revealed that COVID-19-effect response and residence were statistically significantly associated ( $\chi^2_{10df}=23.822, p=.008$ ). In short, in this study, the researchers found that residence and the impact of COVID-19 on leisure activities, leisure activity change, the leisure time before the COVID-19 pandemic, the experience of leisure activity change were not statistically significantly associated. More specifically, no matter where the subjects lived, leisure activity change after the COVID-19 pandemic were obvious; their leisure activities changed a lot after the COVID-19 pandemic; their leisure time per week was not different significantly before the COVID-19 pandemic, most of them disliked leisure change after the COVID-19 pandemic and their experiences about the COVID-19 pandemic were quite similar. On the other hand, residence and leisure preference before the COVID-19 pandemic, leisure time after the COVID-19 pandemic, COVID-19-effect response were statistically significantly associated. More specifically, most of the subjects took part in outdoor and indoor activities before the COVID-19 pandemic no matter where they lived; most of the northern and southern subjects spent under one hour, and most of the central subjects spent 1-3 hours on leisure per week after the COVID-19 pandemic. Over 60% of the subjects spent less than three hours on leisure per week after the COVID-19 pandemic. And no matter where the subjects lived, COVID-19 had positive, negative, or neutral impact on their leisure activities. The results were consistent with the study of Saito *et al.* (2015) who found most leisure activities differ significantly among different region groups. In order to answer research question 3 (*Are there any differences between subject's age*

and leisure preference, leisure hour, leisure change before and after the COVID-19 pandemic?) a chi-square test was employed to identify whether there were any differences between subject's age and leisure preference, leisure hour, leisure change before and after the COVID-19 pandemic (as Tables 16-22).

**Table 16. The Chi-square Test between Age and Leisure Preference before the COVID-19 Pandemic**

	outdoors	indoors	out/in	others	total
under 18 yr	1(1.5%)	30(46.2%)	31(47.7%)	3(4.6%)	65
18-25 yrs	2(2.0%)	47(48.0%)	47(48.0%)	1(1.0%)	98
25-35 yrs	3(7.1%)	12(28.6%)	24(57.1%)	3(7.1%)	42
35-45 yrs	9(10.7%)	20(23.8%)	47(56.0%)	8(9.5%)	84
45-55 yrs	22(17.2%)	23(18.0%)	81(63.3%)	2(1.6%)	128
55-65 yrs	17(15.5%)	20(18.2%)	68(61.8%)	5(4.5%)	110
above 65 yrs	5(25.0%)	1(5.0%)	14(70.0%)	0(0%)	20
total	60	153	312	22	547

$\chi^2_{18df}=72.598, p=.000$

From Table 16, 60 of the 547 (11.0%) outdoor participants with different ages, 153 of the 547 (28.0%) indoor participants with different ages, 312 of the 547 (57.0%) outdoor-indoor participants with different ages and 22 of the 547 (4.0%) other-type participants with different ages exhibited the leisure preference before the COVID-19 pandemic. The chi-square test revealed that leisure preference and age before the COVID-19 pandemic were statistically significantly associated ( $\chi^2_{18df}=72.598, p=.000$ ).

**Table 17. The Chi-square Test between Age and Impact of COVID-19 on Leisure Activities**

	yes	no	neutral	total
under 18 yr	44(67.7%)	15(23.1%)	6(9.2%)	65
18-25 yrs	83(84.7%)	11(11.2%)	4(4.1%)	98
25-35 yrs	36(85.7%)	5(11.9%)	1(2.4%)	42
35-45 yrs	78(92.9%)	6(7.1%)	0(0%)	84
45-55 yrs	120(93.8%)	8(6.3%)	0(0%)	128
55-65 yrs	100(90.9%)	10(9.1%)	0(0%)	110
above 65 yrs	17(85.0%)	3(15.0%)	0(0%)	20
total	478	58	11	547

$\chi^2_{12df}=43.353, p=.000$

From Table 17, 478 of the 547 (87.4%) participants with different ages showed that the COVID-19 pandemic had impact on their leisure, 58 of the 547 (10.6%) no impact and 11 of the 547 (2.0%) no specific response. The chi-square test revealed that the impact of COVID-19 on leisure activities and age were statistically significantly associated ( $\chi^2_{12df}=43.353, p=.000$ ).

**Table 18. The Chi-square Test between Age and Leisure Activity Change after the COVID-19 Pandemic**

	obvious	obscure	neutral	total
under 18 yr	35(53.8%)	25(38.5%)	5(7.7%)	65
18-25 yrs	62(63.3%)	32(32.7%)	4(4.1%)	98
25-35 yrs	34(81.0%)	8(19.0%)	0(0%)	42
35-45 yrs	68(81.0%)	14(16.7%)	2(2.4%)	84
45-55 yrs	103(80.5%)	24(18.8%)	1(0.8%)	128
55-65 yrs	88(80.0%)	21(19.1%)	1(0.9%)	110
above 65 yrs	16(80.0%)	4(20.0%)	0(0%)	20
total	406	128	13	547

$\chi^2_{12df}=34.024, p=.001$

From Table 18, 406 of the 547 (74.2%) participants with different ages showed that leisure activity change after the COVID-19 pandemic was obvious, 128 of the 547 (23.4%) obscure and 13 of the 547 (2.4%) no specific response. The chi-square test revealed that leisure activity change and age were statistically significantly associated ( $\chi^2_{12df}=34.024, p=.001$ ).

**Table 19. The Chi-square Test between Age and Leisure Time per Week before the COVID-19 Pandemic**

	under 1 hour	1-3 hours	3-5 hours	5-7 hours	above 7 hours	total
under 18 yr	9 (13.8%)	16 (24.6%)	17 (26.2%)	8 (12.3%)	15 (23.1%)	65
18-25 yrs	7 (7.1%)	19 (19.4%)	22 (22.4%)	18 (18.4%)	32 (32.7%)	98
25-35 yrs	1 (2.4%)	8 (19.0%)	5 (11.9%)	11 (26.2%)	17 (40.5%)	42
35-45 yrs	3 (3.6%)	18 (21.4%)	25 (29.8%)	13 (15.5%)	25 (29.8%)	84
45-55 yrs	8 (6.3%)	22 (17.2%)	29 (22.7%)	27 (21.1%)	42 (32.8%)	128
55-65 yrs	9 (8.2%)	13 (11.8%)	23 (20.9%)	27 (24.5%)	38 (34.5%)	110
above 65 yrs	0(0%)	4 (20.0%)	3 (15.0%)	2 (10.0%)	11 (55.0%)	20
total	37	100	124	106	130	547

$\chi^2_{24df}=30.613, p=.165$

From Table 19, before the COVID-19 pandemic, 37 of the 547 (6.8%) subjects from different ages spent less than one hour leisure time, 100 of the 547 (18.3%) subjects 1-3 hours, 124 of the 547 (22.7%) subjects 3-5 hours, 106 of the 547 (19.4%) subjects 5-7 hours, and 130 of the 547 (23.9%) subjects above 7 hours per week. The chi-square test revealed that the leisure time per week before COVID-19 pandemic and age were not statistically significantly associated ( $\chi^2_{24df}=30.613, p=.165$ ).

**Table 20. The Chi-square Test between Age and Leisure Time per Week after the COVID-19 Pandemic**

	under 1 hour	1-3 hours	3-5 hours	5-7 hours	above 7 hours	total
under 18 yr	17 (26.2%)	19 (29.2%)	7 (10.8%)	3 (4.6%)	19 (29.2%)	65
18-25 yrs	22 (22.4%)	25 (25.5%)	13 (13.3%)	10 (10.2%)	28 (28.6%)	98
25-35 yrs	8 (19.0%)	12 (28.6%)	6 (14.3%)	8 (19.0%)	8 (19.0%)	42
35-45 yrs	30 (35.7%)	27 (32.1%)	15 (17.9%)	7 (8.3%)	5 (6.0%)	84
45-55 yrs	52 (40.6%)	42 (32.8%)	15 (11.7%)	10 (7.8%)	9 (7.0%)	128
55-65 yrs	37 (33.6%)	33 (30.0%)	21 (19.1%)	7 (6.4%)	12 (10.9%)	110
above 65 yrs	4 (20.0%)	3 (15.0%)	3 (15.0%)	6 (30.0%)	4 (20.0%)	20
total	170	161	80	51	85	547

$\chi^2_{24df}=64.536, p=.000$

From Table 20, after the COVID-19 pandemic, 170 of the 547 (31.1%) subjects spent less than one hour on leisure activities per week, 161 of the 547 (29.4%) subjects 1-3 hours, 80 of the 547 (14.6%) subjects 3-5 hours, 51 of the 547 (9.3%) subjects 5-7 hours, and 85 of the 547 (15.5%) subjects above 7 hours. The chi-square test revealed that the leisure time per week after COVID-19 pandemic and age were statistically significantly associated ( $\chi^2_{24df}=64.536, p=.000$ ).

**Table 21: The Chi-square between Age and the Experience about Leisure Activity Change after the COVID-19 Pandemic**

	like	dislike	neutral	total
under 18 yr	7(10.8%)	28(43.1%)	30(46.2%)	65
18-25 yrs	14(14.3%)	62(63.3%)	22(22.4%)	98
25-35 yrs	3(7.1%)	32(76.2%)	7(16.7%)	42
35-45 yrs	5(6.0%)	69(82.1%)	10(11.9%)	84
45-55 yrs	6(4.7%)	107(83.6%)	15(11.7%)	128
55-65 yrs	8(7.3%)	98(89.1%)	4(3.6%)	110
above 65 yrs	3(15.0%)	17(85.0%)	0(0%)	20
total	46	413	88	547

$\chi^2_{12df}=79.223, p=.000$

From Table 21, 46 of the 547 (8.4%) subjects showed that they liked the change of leisure activity after the COVID-19 pandemic, 413 of the 547 (75.5%) subjects disliked, and 88 of the 547 (16.1%) subjects had no specific response. The chi-square test revealed that the

experience of leisure activity change and age were statistically significantly associated ( $\chi^2_{12df}=79.223, p=.000$ ).

**Table 22. The Chi-square Test between Age and Effect of COVID-19 on Leisure Activity**

	positive	negative	neutral	total
under 18 yr	18(27.7%)	17(26.2%)	30(46.2%)	65
18-25 yrs	27(27.6%)	37(37.8%)	34(34.7%)	98
25-35 yrs	8(19.0%)	20(47.6%)	14(33.3%)	42
35-45 yrs	24(28.6%)	38(45.2%)	22(26.2%)	84
45-55 yrs	35(27.3%)	60(46.9%)	33(25.8%)	128
55-65 yrs	33(30.0%)	54(49.1%)	23(20.9%)	110
above 65 yrs	9(45.0%)	8(40.0%)	3(15.0%)	20
total	154	234	159	547

$\chi^2_{12df}=6.290, p=.031$

From Table 22, 154 of the 547 (28.2%) subjects from different ages felt that the effect of COVID-19 on their leisure activities was positive, 234 of the 547 (42.8%) subjects negative and 159 of the 547 (29.1%) subjects neutral. The chi-square test revealed that COVID-19-effect response and age were statistically significantly associated ( $\chi^2_{12df}=6.290, p=.031$ ). In short, in this study, the researchers found that age and leisure preference before the COVID-19 pandemic, the impact of COVID-19 on leisure activities, leisure activity change, the leisure time after COVID-19 pandemic, the experience of leisure activity change, COVID-19-effect response were statistically significantly associated. More specifically, the subjects under 18 years old and 18-25 years old preferred indoor activities or indoor-outdoor activities, and the subjects over 25 years old preferred indoor-outdoor activities before the COVID-19 pandemic, which was consistent with the study of Takiguchi *et al.* (2022); most of the subjects from different age groups felt the impact of COVID-19 on their leisure activities; most of the subjects from different age groups obviously felt their leisure activity change after the COVID-19 pandemic. Moreover, the groups from 35-65 years old spent less than one hour on leisure activities; more retirees spent 5-7 hours on leisure activities, and the subjects under 35 years old spent 1-3 hours or above 7 hours on leisure activities after the COVID-19 pandemic. In addition, after the COVID-19 pandemic, most of the subjects over 18 years old disliked the experience of leisure change, and most of the subjects under 18 years old disliked the experience of leisure change or had no special response, which was consistent with the study of Takiguchi *et al.* (2022). Furthermore, the subjects from 18-65 years old felt the negative effect of COVID-19 on their leisure activities; the subjects under 18 years old had neutral response about the effect of COVID, and the retirees felt the positive effect of COVID-19. However, Kim *et al.* (2020) found the groups aged 50-62 years were more mindful of their activities and Kim and Cho (2020) found adolescents and adults in their 60s did more activities because they would like to stay healthy.

**Table 23. The Chi-square Test between Occupation and Leisure Preference before the COVID-19**

	outdoors	indoors	out/in	others	total
Group 1	4(2.7%)	71(48.6%)	68(46.6%)	3(2.1%)	146
Group 2	12(11.7%)	25(24.3%)	65(63.1%)	1(1.0%)	103
Group 3	1(6.7%)	3(20.0%)	11(73.3%)	0(0%)	15
Group 4	0(0%)	1(20.0%)	4(80.0%)	0(0%)	5
Group 5	4(14.3%)	6(21.4%)	16(57.1%)	2(7.1%)	28
Group 6	1(25.0%)	0(0%)	1(25.0%)	2(50.0%)	4
Group 7	7(16.7%)	11(26.2%)	22(52.4%)	2(4.8%)	42
Group 8	3(10.7%)	5(17.9%)	20(71.4%)	0(0%)	28
Group 9	9(22.5%)	4(10.0%)	27(67.5%)	0(0%)	40
Group 10	8(18.2%)	5(11.4%)	31(70.5%)	0(0%)	44
Group 11	11(12.0%)	22(23.9%)	47(51.1%)	12(13.0%)	92
total	60	153	312	22	547

$\chi^2_{30df}=113.199, p=.000$ ; Note: group1: student; group2: solider, teacher, government employee; group3: hospitality industry; group4: architecture; group5: construction, mechanic; group6: agriculture, fishery; group7: medical employee; group8: business; group 9: service industry; group10: retiree; group 11: others

On the other hand, the leisure time per week before COVID-19 pandemic and age were not statistically significantly associated. In other words, different age groups spent similar leisure time per week before the COVID-19 pandemic. In order to answer research question 4 (*Are there any differences between subject's occupation and leisure preference, leisure hour, leisure change before and after the COVID-19 pandemic?*), a chi-square test was employed to identify whether there were any differences between subject's occupation and leisure preference, leisure hour, leisure change before and after the COVID-19 pandemic (as Tables 23-29). From Table 23, 60 of the 547 (11.0%) outdoor-type participants with different occupations, 153 of 547 (28.0%) indoor-type participants with different occupations, 312 of 547 (57.0%) both-type participants with different occupations and 22 of the 547 (4.0%) other-type participants with different occupations exhibited the leisure preference before the COVID-19 pandemic. The chi-square test revealed that leisure preference and occupation before the COVID-19 pandemic were statistically significantly associated ( $\chi^2_{30df}=113.199, p=.000$ ).

**Table 24. The Chi-square Test between Occupation and Impact of COVID-19 on Leisure Activities**

	yes	no	neutral	total
Group 1	112(76.7%)	24(16.4%)	10(6.8%)	146
Group 2	93(90.3%)	10(9.7%)	0(0%)	103
Group 3	15(100%)	0(0%)	0(0%)	15
Group 4	5(100%)	0(0%)	0(0%)	5
Group 5	28(100%)	0(0%)	0(0%)	28
Group 6	3 (75.0%)	1 (25.0%)	0(0%)	4
Group 7	39(92.9%)	3(7.1%)	0(0%)	42
Group 8	26(92.9%)	2(7.1%)	0(0%)	28
Group 9	36(90.0%)	4(10.0%)	0(0%)	40
Group 10	39(88.6%)	5(11.4%)	0(0%)	44
Group 11	82(89.1%)	9(9.8%)	1(1.1%)	92
total	478	58	11	547

$\chi^2_{20df}=38.382, p=.008$

Note: group1: student; group2: solider, teacher, government employee; group3: hospitality industry; group4: architecture; group5: construction, mechanic; group6: agriculture, fishery; group7: medical employee; group8: business; group 9: service industry; group10: retiree; group 11: others

From Table 24, 478 of the 547 (87.4%) participants showed that COVID-19 pandemic had impact on their life, 58 of 547 (10.6%) no impact and 11 of the 547 (2.0%) no specific response. The chi-square test revealed that the impact of COVID-19 on leisure activities and occupation were statistically significantly associated ( $\chi^2_{20df}=38.382, p=.008$ ).

**Table 25. The Chi-square Test between Occupation and Leisure Activity Change after COVID-19 Pandemic**

	obvious	obscure	neutral	total
Group 1	85(58.2%)	52(35.6%)	9(6.2%)	146
Group 2	74(71.8%)	27(26.2%)	2(1.9%)	103
Group 3	12(80.0%)	2(13.3%)	1(6.7%)	15
Group 4	4(80.0%)	1(20.0%)	0(0%)	5
Group 5	23(82.1%)	5(17.6%)	0(0%)	28
Group 6	4(100%)	0(0%)	0(0%)	4
Group 7	34(81.0%)	7(16.7%)	1(2.4%)	42
Group 8	24(85.7%)	4(14.3%)	0(0%)	28
Group 9	33(82.5%)	7(17.5%)	0(0%)	40
Group 10	36(81.8%)	8(18.2%)	0(0%)	44
Group 11	77(83.7%)	15(16.3%)	0(0%)	92
total	406	128	13	547

$\chi^2_{20df}=40.696, p=.004$  Note: group1: student; group2: solider, teacher, government employee; group3: hospitality industry; group4: architecture; group5: construction, mechanic; group6: agriculture, fishery; group7: medical employee; group8: business; group 9: service industry; group10: retiree; group 11: others

From Table 25, 406 of the 547 (74.2%) participants showed that leisure activity change after COVID-19 pandemic was obvious, 128 of 547 (23.4%) obscure and 13 of the 547 (2.4%) no specific response. The chi-square test revealed that leisure activity change and occupation were statistically significantly associated ( $\chi^2_{20df}=40.696, p=.004$ ).

**Table 26. The Chi-square Test between Occupation and Leisure Time per Week before the COVID-19**

	under 1 hour	1-3 hours	3-5 hours	5-7 hours	Above 7 hours	total
Group 1	17(11.6%)	31(21.2%)	34(23.3%)	22(15.1%)	42(28.8%)	146
Group 2	4(3.9%)	18(17.5%)	28(27.2%)	25(24.3%)	28(27.2%)	103
Group 3	0(0%)	2(13.3%)	4(26.7%)	3(20.0%)	6(40.0%)	15
Group 4	0(0%)	0(0%)	1(20.0%)	2(40.0%)	2(40.0%)	5
Group 5	0(0%)	6(21.4%)	6(21.4%)	7(25.0%)	9(32.1%)	28
Group 6	0(0%)	2(50.0%)	1(25.0%)	0(0%)	1(25.0%)	4
Group 7	1(2.4%)	7(16.7%)	12(28.6%)	7(16.7%)	15(35.7%)	42
Group 8	2(7.1%)	4(14.3%)	7(25.0%)	6(21.4%)	9(32.1%)	28
Group 9	0(0%)	6(15.0%)	11(27.5%)	9(22.5%)	14(35.0%)	40
Group 10	2(4.5%)	7(15.9%)	2(4.5%)	9(20.5%)	24(54.5%)	44
Group 11	11(12.0%)	17(18.5%)	18(19.6%)	16(17.4%)	30(32.6%)	92
total	37	100	124	106	130	547

$\chi^2_{40df}=45.915, p=.240$ ; Note: group1: student; group2: soldier, teacher, government employee; group3: hospitality industry; group4: architecture; group5: construction, mechanic; group6: agriculture, fishery; group7: medical employee; group8: business; group 9: service industry; group10: retiree; group 11: others

From Table 26, 37 of the 547 (6.8%) under-one-hour leisure participants, 100 of 547 (18.3%) 1-3 hour leisure participants, 124 of 547 (22.7%) 3-5 hour leisure participants, 106 of the 547 (19.4%) 5-7 hour leisure participants, and 180 of the 547 (32.9%) above-7 hour leisure exhibited the leisure time per week before the COVID-19 pandemic. The chi-square test revealed that the leisure time per week before the COVID-19 pandemic and occupation were not statistically significantly associated ( $\chi^2_{40df}=45.915, p=.240$ ).

**Table 27. The Chi-square Test between Occupation and Leisure Time per Week after the COVID-19**

	under 1 hour	1-3 hours	3-5 hours	5-7 hours	Above 7 hours	total
Group 1	36(24.7%)	37(25.3%)	18(12.3%)	11(7.5%)	44(30.1%)	146
Group 2	30(29.1%)	36(35.0%)	21(20.4%)	9(8.7%)	7(6.8%)	103
Group 3	8(53.3%)	3(20.0%)	0(0%)	1(6.7%)	3(20.0%)	15
Group 4	2(40.0%)	0(0%)	2(40.0%)	0(0%)	1(20.0%)	5
Group 5	9(32.1%)	8(28.6%)	5(17.9%)	4(14.3%)	2(7.1%)	28
Group 6	1(25.0%)	3(75.0%)	0(0%)	0(0%)	0(0%)	4
Group 7	15(35.7%)	11(26.2%)	8(19.0%)	4(9.5%)	4(9.5%)	42
Group 8	11(39.3%)	9(32.1%)	4(14.3%)	2(7.1%)	2(7.1%)	28
Group 9	13(32.5%)	10(25.0%)	5(12.5%)	8(20.0%)	4(10.0%)	40
Group 10	11(25.0%)	10(22.7%)	10(22.7%)	7(15.9%)	6(13.6%)	44
Group 11	34(37.0%)	34(37.0%)	7(7.6%)	5(5.4%)	12(13.0%)	92
total	170	161	80	51	85	547

$\chi^2_{40df}=72.042, p=.001$  Note: group1: student; group2: soldier, teacher, government employee; group3: hospitality industry; group4: architecture; group5: construction, mechanic; group6: agriculture, fishery; group7: medical employee; group8: business; group 9: service industry; group10: retiree; group 11: others

From Table 27, 170 of the 547 (31.1%) under-one-hour leisure participants, 161 of 547 (29.4%) 1-3 hour leisure participants, 80 of 547 (14.6%) 3-5 hour leisure participants, 51 of the 547 (9.3%) 5-7 hour leisure participants, and 85 of the 547 (15.5%) above-7 hour leisure exhibited the leisure time per week after the COVID-19 pandemic. The chi-square test revealed that the leisure time per week after the COVID-19 pandemic and occupation were statistically significantly associated ( $\chi^2_{40df}=72.042, p=.001$ ).

**Table 28. The Summary of Chi-square between Occupation and the Experience about Leisure Activity Change after the COVID-19**

	like	dislike	neutral	total
Group 1	21(14.4%)	79(54.1%)	46(31.5%)	146
Group 2	6(5.8%)	89(86.4%)	8(7.8%)	103
Group 3	1(6.7%)	12(80.0%)	2(13.3%)	15
Group 4	0(0%)	4(80.0%)	1(20.0%)	5
Group 5	0(0%)	25(89.3%)	3(10.7%)	28
Group 6	1(25.0%)	3(75.0%)	0(0%)	4
Group 7	6(14.3%)	32(76.2%)	4(9.5%)	42
Group 8	0(0%)	23(82.1%)	5(17.9%)	28
Group 9	1(2.5%)	35(87.5%)	4(10.0%)	40
Group 10	4(9.1%)	38(86.4%)	2(4.5%)	44
Group 11	6(6.5%)	73(79.3%)	13(14.1%)	92
total	46	413	88	547

$\chi^2_{20df}=63.571, p=.000$ ; Note: group1: student; group2: soldier, teacher, government employee; group3: hospitality industry; group4: architecture; group5: construction, mechanic; group6: agriculture, fishery; group7: medical employee; group8: business; group 9: service industry; group10: retiree; group 11: others

From Table 28, 46 of the 547 (8.4%) participants showed that they liked the change of leisure activity after the COVID-19 pandemic, 413 of 547 (75.5%) disliked and 88 of the 547 (16.1%) no specific response. The chi-square test revealed that the experience of leisure activity change and occupation were statistically significantly associated ( $\chi^2_{20df}=63.571, p=.000$ ).

**Table 29: The Chi-square Test between Occupation and Effect of COVID-19 on Leisure Activity**

	positive	negative	neutral	total
Group 1	40(27.4%)	45(30.8%)	61(41.8%)	146
Group 2	26(25.2%)	46(44.7%)	31(30.1%)	103
Group 3	3(20.0%)	10(66.7%)	2(13.3%)	15
Group 4	0(0%)	4(80.0%)	1(20.0%)	5
Group 5	6(21.4%)	15(53.6%)	7(25.0%)	28
Group 6	2(50.0%)	1(25.0%)	1(25.0%)	4
Group 7	14(33.3%)	19(45.2%)	9(21.4%)	42
Group 8	12(42.9%)	11(39.3%)	5(17.9%)	28
Group 9	6(15.0%)	26(65.0%)	8(20.0%)	40
Group 10	18(40.9%)	18(40.9%)	8(18.2%)	44
Group 11	27(29.3%)	39(42.4%)	26(28.3%)	92
total	154	234	159	547

$\chi^2_{20df}=40.022, p=.005$  Note: group1: student; group2: soldier, teacher, government employee; group3: hospitality industry; group4: architecture; group5: construction, mechanic; group6: agriculture, fishery; group7: medical employee; group8: business; group 9: service industry; group10: retiree; group 11: others

From Table 29, 154 of the 547 (28.2%) positive participants, 234 of 547 (42.8%) negative participants and 159 of the 547 (29.1%) neutral participants exhibited the COVID-19 effect response. The chi-square test revealed that COVID-19-effect response and occupation were statistically significantly associated ( $\chi^2_{20df}=40.022, p=.005$ ). In short, in this study, the researchers found that occupation and leisure preference before the COVID-19 pandemic, the impact of COVID-19 on leisure activities, leisure activity change, the leisure time after the COVID-19 pandemic, the experience of leisure activity were statistically significantly associated. More specifically, the subjects with different occupations significantly had different leisure preference before the COVID-19 pandemic; no matter what kind of work the subjects did, they felt leisure activity change were obvious after the COVID-19 pandemic; most of the subjects spent less time on leisure activities after the COVID-19 pandemic, which was consistent with the study of Kinzel & Müller (2022); most of the subjects had negative experience of leisure activity change after the COVID-19 pandemic, which was consistent with the study of Keller *et al.* (2022), and the subjects with different jobs had significantly different responses about the COVID-19 effect. On the other hand, the leisure time before the COVID-19 pandemic and occupation were not statistically significantly associated. In other words, before the COVID-19 pandemic, no matter what the subjects did, their leisure time had no significant difference. In order to answer research question 5 (*What are subject's leisure preference before, after the COVID-19 pandemic, and the end of the COVID-19 pandemic?*), the subjects could choose three leisure activities they preferred before and after the COVID-19 pandemic. The data were as the following.

- 11% of the subjects preferred outdoor activities, like mountain climbing, hiking, cycling; 28% indoor activities, like reading, listening to music, watching videos; 57% outdoor and indoor activities, and 4% others before the COVID-19 pandemic.
- 62.2% of the subjects preferred to watch TV, 19.7% read books or magazines, 46.4% listen to music, 2% play chess, 6% board games, 31.4% play video games, 71.7% watch videos online, 20.3% do yoga, do aerobic exercise, step on the flywheel, smart fitness, 6.4% sing, and 15.7% others after the COVID-19 pandemic. The finding was consistent with the studies of Kim *et al.* (2020), Kim (2020), Lee (2020), and Kang & Ban (2020).
- When the pandemic is over, 53.6% of the subjects like to travel abroad, 61.2% travel in Taiwan, 63.3% gather with family or friends, 63.1% do outdoor activities, 24.5% see a movie, 7.1% go to a concert, 6.6% go to party, and 8.8% others.



In sum, before the COVID-19 pandemic, most of the subjects did outdoor and indoor activities. After the COVID-19 pandemic, watching TV, watching videos online, and listening to music were the subjects' major leisure activities. When the COVID-19 is over, gathering with family or friends, doing outdoor activities, and traveling in Taiwan will be the subjects' major choices.

## CONCLUSION

Based on the results, the researchers drew some conclusion as the following. First, gender and leisure time before and after the COVID-19 pandemic, and COVID-19-effect were statistically significantly associated. Female subjects spent more leisure time before the COVID-19 pandemic, but spent less leisure time after the COVID-19 pandemic than male ones; the effect of COVID-19 had more significant effect on female subjects than male ones. Second, residence and leisure preference before the COVID-19 pandemic, leisure time after the COVID-19 pandemic, COVID-19-effect response were statistically significantly associated. Most of the subjects took part in outdoor and indoor activities before the COVID-19 pandemic no matter where they lived; most of the subjects spent under three hours on leisure per week after the COVID-19 pandemic. And COVID-19 had positive, negative, or neutral impact on different residence groups' leisure activities. Third, age and leisure preference before the COVID-19 pandemic, the impact of COVID-19 on leisure activities, leisure activity change, the leisure time after COVID-19 pandemic, the experience of leisure activity change, COVID-19-effect response were statistically significantly associated. The subjects over 25 years old preferred indoor-outdoor activities before the COVID-19 pandemic. Moreover, the groups from 35-65 years old spent less than one hour on leisure activities; more retirees spent 5-7 hours on leisure activities after the COVID-19 pandemic. In addition, after the COVID-19 pandemic, most of the subjects over 18 years old disliked the experience of leisure change. Furthermore, the subjects under 18 years old had neutral response about the effect of COVID, and the retirees felt the positive effect of COVID-19. Fourth, occupation and leisure preference before the COVID-19 pandemic, the impact of COVID-19 on leisure activities, leisure activity change, the leisure time after the COVID-19 pandemic, the experience of leisure activity were statistically significantly associated. No matter what kind of work the subjects did, most of them spent less time on leisure activities after the COVID-19 pandemic and had negative experience of leisure activity change after the COVID-19 pandemic. Finally, before the COVID-19 pandemic, most of the subjects did outdoor and indoor activities. After the COVID-19 pandemic, watching TV, watching videos online, and listening to music were the subjects' major leisure activities. When the COVID-19 is over, gathering with family or friends, doing outdoor activities, and traveling in Taiwan will be the subjects' major leisure choices.

### Implications, Limitations, and Future Research

**Implications:** Our research has suggested some potentially important influences of subjects' backgrounds on leisure preference and impact of COVID-19, like subjects' residence, age, occupation, and gender. COVID-19 has changed people's life for about three years and had some effects on people's leisure activities. How to stay healthy is more important during the pandemic. Lim & Pranata (2021) found that the practice of physically active lifestyles was recommended to counteract health and mental consequences of the COVID-19 pandemic. COVID-19 caused the suspension of sporting events, closure of gyms and fitness centers, and restrictions on outdoor activities. Doing yoga, running on a treadmill, taking aerobic exercise, exercising before fitness mirror, or riding a spinning bike will be another feasible leisure option indoors to make people stay physically healthy during the pandemic.

**Limitations and Recommendations for Future Research:** Although the present study has yield findings that have both theoretical and practical implications, its design is not without flaws. In the future research, it could add other variables, such as subjects' income,

educational level (Park *et al.*, 2019), leisure motivation (Lu & Poosala, 2022), and so forth to make the findings more generalized. Moreover, a follow-up study is necessary to analyze the influence of psychological factors by comparing those who stopped and those who continued to participate in sports activities during the pandemic period.

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**Appendix****Leisure Activities Survey During COVID-19****Leisure Activities Survey During COVID-19**

1. What is your gender? male female
2. Where is your residence? northern Taiwan central Taiwan southern Taiwan eastern Taiwan offshore islands  
others\_\_\_\_\_
3. What is your age? under 18 years old 18-25 years old 25-35 years old  
35-45 years old 45-55 years old 55-65 years old  
over 65 years old
4. What is your occupation? student soldier, government employee, teacher  
hospitality construction engineering agriculture, forestry, fishery  
medical staff industrial &commercial service industry retirees others\_\_\_\_\_
5. Your leisure activities before COVID-19 are outdoor activities (mountain climbing, hiking, cycling...) indoor activities (reading, listening to music, watching videos...) outdoor and indoor activities others
6. Choose three activities you do after COVID-19. watching TV reading  
listening to music playing chess board games playing video games watching online videos indoor activities (yoga, aerobic dance, fitness mirror, flywheel...) singing (karaoke) others
7. When the pandemic is over, choose three activities you would like to do.  
travel overseas travel in Taiwan dine together go outside see a movie go to concerts go to parties others
8. Do you think the pandemic have any impact on leisure activities? yes no uncertain
9. Do you think your leisure activities change a lot because of pandemic? yes no uncertain
10. Before the pandemic, how long do you spend on your leisure activities per week? under one hour one-three hours three-five hours  
five-seven hours over seven hours
11. After the pandemic, how long do you spend on your leisure activities per week? under one hour one-three hours three-five hours  
five-seven hours  
over seven hours
12. Do you like the impact of pandemic on your leisure activities? yes no  
uncertain
13. What kind of impact of pandemic on your leisure activities? positive impact (self-discipline, steadiness...) negative impact (worry, fear, anxiety,depression...) no impact

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