The Relationship Between Leisure Activities and Well-being During Social Isolation

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ABSTRACT

Leisure activities are effective ways to cope with stressful life events; however, more research is needed to understand its effects in social isolation. In the current study, we explored whether university students’ participation in leisure activities (such as baking, running, and yoga) has helped protect against some of the negative effects of social isolation due to the COVID-19 pandemic. Specifically, this correlational study aimed to discover (a) the relationship between leisure activity participation and psychological well-being and resilience during periods of social isolation; (b) the type of leisure activity (i.e., physical or nonphysical) that has the most positive effect on overall well-being; and (c) precisely why particular leisure activities were positively associated with well-being and resilience (e.g., do they increase social affiliation, self-efficacy, personal control, flow, and sense of meaning?). To answer these questions, 200 university students completed an online survey asking them about the frequency and type of their participation in leisure activities. Participant’s coronavirus anxiety, sense of well-being, and resiliency were the outcome variables. Results indicated a significant, positive association between leisure activity participation and overall well-being, demonstrated by a decrease in anxiety and an increase in well-being. Contrary to the literature, engagement in more non-physical leisure activities was associated with greater resiliency compared to physical activities. The mechanisms for the positive association were not clear. In sum, this study supports participation in leisure activities as a possible way to cope with social isolation and the negative effects of the current pandemic.

The Relationship between Leisure Activities and Well-being during Social Isolation

The novel COVID-19 global pandemic has brought tremendous challenges for individuals around the world in all aspects of daily life, including work, school, and home. The fear of being infected or loved ones being infected by this unknown respiratory virus, constant worrying regarding contracting symptoms, reading/hearing about the severity of the virus, and uncertainty regarding the length of quarantine have become consuming thoughts for individuals everywhere (Fitzpatrick et al., 2020; Park et al. 2020; Rahman et al., 2020; Twenge and Joiner, 2020). Individuals have had to change how they interact with others by waving rather than shaking hands, social distancing by staying 6 metres apart while wearing a mask, using technology to keep in touch with friends, family, work, school, rather than going in person, decreasing the frequency of their grocery shopping/eating out, and always avoiding congregations (Government of Canada, 2020). These changes have forced people to adapt to a new normal to help reduce the spread of this virus (Park et al. 2020; Walsh, 2020), which has brought great challenges for well-being.

With the accumulation of these new protective measures, it is no surprise that the psychological well-being of individuals has taken a toll during this time (Fitzpatrick et al., 2020; Huong and Zhao, 2020; Lahav, 2020; Rahman et al., 2020; Tran et al., 2020; Twenge and Joiner, 2020; Vindegaard and Benros, 2020). In a US national study measuring the prevalence of anxiety and depressive disorders before and during the COVID-19 pandemic, Twenge and Joiner (2020) found American adults were more than three times as likely to screen positive for anxiety disorders,
depressive disorders, or both during April and May of 2020, than compared to American adults in the first half of 2019. Further support for the decline in psychological well-being is demonstrated by Fitzpatrick et al. (2020) using a representative sample of 10,368 US adults who concluded that individuals who reported higher COVID-19 related worries were associated with meeting the threshold screening for generalized anxiety and depression. Rahman et al. (2020) went further to identify risk factors during COVID-19 that could lead to psychological distress and concluded that being female, having pre-existing mental health conditions, high risk behaviors, including smoking and drinking alcohol, and high levels of fear of COVID-19 made individuals at risk for moderate to high levels of psychological distress. These findings indicate that studying the psychological well-being of individuals is an important component to understanding the true impact of this pandemic and to finding solutions to how individuals can cope during this period. Thus, in this correlational, online study, we focussed on leisure activities and psychological well-being and resilience to determine whether participating in leisure activities has helped individuals cope with the negative impacts of social isolation due to the current global pandemic.

Why, and How Leisure Activities are Adaptive Coping Mechanisms

Empirical research on coping mechanisms of individuals during stressful life events spans five decades and it has revealed concepts that are important for buffering against the impacts of stressful events. For example, some research showed maintaining personal control, which is the idea of feeling in control during a threatening situation (Chorpita & Barlow, 1998) can help individuals feel that they have some power during stressful periods, which in turn can help buffer them against psychological distress that occurs during stressful periods (Chorpita and Barlow, 1998; Diel & Hay, 2010; Kay et al., 2009; O'Connor & Shimizu, 2002; Ong et al., 2005; Southwick et al., 2016). However, these effects can vary with contexts, such as culture. O’Connor and Shimizu (2002) reported that individuals from individualistic cultures tended to benefit from increased personal control compared to individuals from collectivist cultures. Thus, the effectiveness of improving a sense of personal control during stressful periods may vary for individuals who come from different cultures, which may determine variance in well-being for some individuals. Nonetheless, it is plausible that engaging in a leisure activity may promote a sense of personal control during stressful periods because the individual is able to implement a general routine with an activity during such a period and restore that sense of control that they may have lost. This can help them cope and possibly motivate them to continue through a period that can be difficult. Moreover, stressful life events may also cause individuals to doubt in their ability to cope or solve the problem that may be causing them such stress, so an activity that increases their confidence level is important during this period.

Self-efficacy, which refers to an individual’s belief in his or her ability to be effective in completing a task (Butler and Gasson, 2005), has been an important aspect when coping with stressful life events because of their buffering effect against psychological distress (Al-Dwaikat et al., 2020; Chung & Elias, 1996; Maciejewski et al. 2000; Palesh et al. 2006; Rayan, 2019). For example, among women living with breast cancer in rural communities, Palesh et al. (2006) reported greater emotional self-efficacy to be inversely related to mood disturbances. The authors interpreted this to mean mood disturbances, as a result of stressful life events, may decrease with greater skill and confidence in ability to regulate emotional responses. These findings support the likelihood that engaging in a leisure activity may promote self-efficacy by allowing individuals to practice skills, such as emotion regulation during stressful life periods. In addition, coping with stressful life periods may require more than feeling a sense of control and self-efficacy. For many individuals, having a way to connect socially with others during such a period may be critical to their coping and overall well-being.

Positive social connection or affiliation is an important factor when coping and maintaining well-being during stressful life events (Cohen et al., 1985; Kaslow et al., 2002; Perez et al., 2015; Treharne et al., 2007; Yanos & Rosario, 2014). Social connections that allow for companionship and emotional support show various benefits for the well-being of individuals, including mediating the effects of anxiety and depression (Dalgard et al., 1995; Jacobson et al., 2017), decreased risk for suicide ideation (Clum and Febbraro, 1994), greater life satisfaction, strengthening self-
esteem (Cohen et al., 1985), decreased risk for mortality in old age (Leigh-Hunt et al., 2017), and stronger physical health (Kiecolt-Glaser et al., 2002; Kok et al. 2013). Interestingly, some researchers have reported that social connection and self-esteem are needed to effectively cope with stress and buffer against psychological distress (Dumont & Provost, 1999; Friedlander et al., 2007). These findings indicate that being connected and affiliated with others is an important factor in helping individuals cope with stressful life events, and this effect may be more significant in addition to other aspects such as self-esteem. With this understanding, it is possible that engaging in leisure activities that help to socially connect individuals to others, such as family or friends, may help to improve well-being during this pandemic. Interestingly, this study explored if this mechanism for well-being was still relevant in the context of social isolation and if individuals were utilizing new ways to still stay socially connected while participating in leisure activities, such as through virtual platforms. These psychological mechanisms are important for individuals to cope well during stressful life periods, but leisure activities may help provide even more help by increasing other psychological mechanisms.

Leisure activities can also provide individuals a way to gain a sense of meaning or purpose (Chun & Lee, 2020; Iwasaki et al., 2015; Iwasaki, 2017; Iwasaki et al., 2018; Iwasaki, 2008; Iwasaki et al., 2014). This has been found to be beneficial for individuals’ well-being (Reker et al., 1987; Sumner et al., 2015; Zika & Chamberlain, 1992). In addition, it can induce a sense of flow, the subjective feeling of being completely engrossed in an appropriately challenging task that stretches one’s existing skills (Nakamura & Csikszentmihalyi, 2014), (Chang 2017; Havitz & Mannell, 2005; Lee & Payne, 2016; Mackenzie et al., 2011). Flow is characterized by the feeling that one is in control and is efficacious for the task, feeling lost in the moment (i.e., time has passed faster than normal), and feeling the task is intrinsically motivating (Nakamura & Csikszentmihalyi, 2014). These aspects may be beneficial during stressful times because it can allow the individual to escape the stress and be involved in an activity that can provide a sense of control and intrinsic motivation. These mechanisms may come through participation in leisure activities which can be different for all individuals because it would need to be intrinsically related to their sense of meaning in life or it allows them to feel engrossed in the activity in order to induce that sense of flow. In sum, research shows that participating in leisure or recreational activities can be a possible way to acquire or maintain personal control, social connection, and self-efficacy among other protective factors (Cladwell, 2005; Garcia-Martin et al. 2004; Iso-Ahola & Park, 1996). Due to the decline in psychological well-being as a consequence of this global pandemic, it was necessary to examine possible leisure activities that were helping individuals cope with this stressful life event.

Leisure Activities and Reductions in Stress

Studies exploring the effects of leisure activities on stress and anxiety reduction have primarily focused on the role of physical leisure activities, (e.g., sports and exercise) over non-physical leisure activities (e.g., watching movies and cooking) have played in promoting psychological and emotional well-being (Bailey et al. 2016; Chen et al., 2012; Parker et al., 2016; Stubbe et al., 2007). Participating in exercise has been shown to improve feelings of life satisfaction (Stubbe et al., 2007) and reduce depressive symptoms (Parker et al., 2016). These benefits are acknowledged by Chen et al. (2012), however, they argue these benefits are present only when the physical activity is high in intensity because individuals are able to receive the full physiological benefits, such as the release of endorphins. These findings indicate that physical activity can be one way to cope with stress and anxiety, but recent studies have also found positive effects of non-physical leisure activities on stress and anxiety reduction (Conner et al., 2018; Chin & Rickard, 2014; Riley et al., 2013; Szabo, 2017).

Conner et al. (2018) found that participating in creative activities, such as drawing, painting, and writing, can help individuals feel more excited, purposeful, and socially connected. Knitting frequently is helpful in relieving stress and increasing confidence levels, which is helpful in reducing anxiety (Riley et al., 2013). Also, engaging in music, through dancing and singing, can help individuals regulate their emotion through the process of cognitive reappraisal (i.e., altering the emotional impact of a situation by changing the meaning associated with it) (Chin & Rickard, 2014). Interestingly, Szabo (2017) tested whether watching a 20-minute comedy show or participating in physical activity...
would have a stronger, positive influence on feelings of anxiety and found humor, which came from watching the comedy show, to be more effective than physical activity for some individuals. These findings suggest that non-physical leisure activities should not be overlooked when trying to reduce the effects of stress and anxiety. Thus, exploring the effects of different types of leisure activities on stress and anxiety in the context of social isolation can help us get a better understanding of their true effect on well-being. In short, the literature supports the benefits of engaging in leisure activities during stressful life periods. The central question that was examined in this study is if this relationship exists in the context of social isolation in the current global pandemic.

The Current Research

The sum of the literature indicates that leisure activities can be beneficial for an individual’s psychological well-being, especially during stressful life events. No research, as far as we know, had yet to examine this relationship in the context of COVID-19 social distancing restrictions. Thus, this study aimed to contribute to this new area of research by investigating the relationship between leisure activities and psychological well-being and resilience during the period of social isolation. This study was unique because it explored the relationship between leisure activities and well-being in the context of social isolation and determined why particular leisure activities are beneficial. In addition, it went further by exploring what levels of participation in physical and non-physical leisure activities (i.e., high or low levels) would show greatest positive effect on well-being. We hoped to discover (a) the relationship between leisure activity participation and psychological wellbeing and resilience during social isolation among Canadian university students during periods of social isolation in the current pandemic; (b) the type of leisure activity (i.e., physical or nonphysical) that has the most positive effect on overall wellbeing; and (c) precisely why particular leisure activities were positively associated well-being and resilience (e.g., do they increase social affiliation, self-efficacy, personal control, flow, and meaning?). To answer these questions, we administered an online survey to university students measuring the frequency of their leisure activities participation in a week and compared those scores with their overall well-being, which was composed of questions measuring subjective sense of well-being, anxiety surrounding the coronavirus pandemic, and resiliency.

Based on the findings from previous research (Cladwell, 2005; Garcia-Martin et al., 2004; Iso-Ahola & Park, 1996), we expected to see a positive relationship between participation in leisure activities and psychological well-being and resilience. This will be determined by the frequency of participation in leisure activities (i.e., more frequent participation throughout the week will be correlated with greater psychological well-being and resilience). Moreover, compared to non-physical activities, we expect physical leisure activities (such as running and tennis) to be most positively associated with psychological well-being and resilience based on previous findings (Bailey et al. 2016; Chen et al., 2012; Parker et al., 2016; Stubbe et al., 2007). In terms of why particular leisure activities would be positively associated with well-being, we remained undetermined about which potential mechanism was important because research has not reported, at least to our knowledge, the most common mechanisms for why participation in leisure activities can increase overall well-being, so it was possible for any of the mechanisms mentioned above to be a possible answer to this question. For this question, we ran a mediation analysis to determine which mechanism (e.g., social affiliation, personal control, and self-efficacy) was associated with the greatest levels of well-being and resilience.

Method

Participants

Participants were 200 university students from the University of Manitoba’s PSYC 1200: Introduction to Psychology course. A power analysis was conducted using GPower 3.1 for sample size estimation and results indicated that a
sample size of $N = 150$ was required to achieve an alpha = .05 and power = .80. Thus, our proposed sample size of $N = 200$ was adequate for the main objective of this study. There were no exclusion criteria. At the end of their participation, students received one credit towards their research participation requirement for PSYC 1200.

For the purpose of this study, no participants were excluded. All participants completed the survey in a reasonable time frame. 71 participants chose to not state their birth year (35.5%), but the majority of those who did were 19 years old (34.5%). Taking into consideration that there were three participants who were missing responses, 77.5% identified as female ($n = 155$) and 20% identified as male ($n = 40$). In addition, 30% identified as ‘White (European)’ ($n = 60$), 25% identified as ‘East and Southeast Asians’ ($n = 50$), and the other 45% were composed majority of South Asians, Central and West Africans, South and East Africans, and African Americans. Table 1 includes complete demographic data. With regards to the extent to which participants had disposable income to spend on leisure activities, 60% reported ‘about right’ ($n = 120$) and 19% reported ‘too little’ ($n = 38$). There was 1.5% of missing data across study variables, with the exception of the variable measuring age, which had 71 participants who did not answer.

**Table 1. Descriptive Statistics of Participants**

| Demographic Characteristics | Frequency | Percentage |
|-----------------------------|-----------|------------|
| Gender                      |           |            |
| Male                        | 40        | 20%        |
| Female                      | 155       | 77.5%      |
| Trans-gender                | -         | -          |
| Non-binary                  | 2         | 1%         |
| Prefer not to say           | -         | -          |
| Not listed                  | -         | -          |
| Age                         |           |            |
| 41 - 25                     | 4         | 2%         |
| 26 - 22                     | 12        | 6%         |
| 21                          | 11        | 5.5%       |
| 20                          | 24        | 12%        |
| 19                          | 69        | 34.5%      |
| 18                          | 2         | 1%         |
| Undistinguishable           | 7         | 3.5%       |
| Unanswered                  | 71        | 35.5%      |
| Disposable Income           |           |            |
| Far Too Little              | 24        | 12%        |
| Too Little                  | 38        | 19%        |
| About Right                 | 120       | 60%        |
| Too Much                    | 12        | 6%         |
| Far Too Much                | 3         | 1.5%       |
Ethnicity/Race

| Ethnicity/Race                                      | N  | %    |
|---------------------------------------------------|----|------|
| North American Aboriginal (First Nations, Inuit, Metis) | 11 | 5.5% |
| White (European)                                   | 60 | 30%  |
| Caribbean                                          | 3  | 1.5% |
| Latin, Central, South American                     | 7  | 3.5% |
| African American                                   | 14 | 7%   |
| Central and West African                           | 2  | 1%   |
| North African                                      | 7  | 3.5% |
| South and East African                             | 8  | 4%   |
| West Central Asians and Middle Eastern             | 22 | 11%  |
| South Asians                                       | 50 | 25%  |
| East and Southeast Asians                          | 1  | .5%  |
| Australian, New Zealander, Pacific Islander        | 2  | 1%   |
| Multiracial or biracial                            | 10 | 5%   |
| Not listed                                         | 11 | 5.5% |

1 N = 200 for age. N = 197 for gender, disposable income, and ethnicity/race. Majority of participants were female (77.5%). 71 participants chose to not state their birth year (35.5%), but the majority of those who did were 19 years old (34.5%). Most participants reported having just the right amount of disposable income to spend on their leisure activities (60%). White and East and Southeast Asians make up the majority (55%) of the participants, with the other half made up of various ethnicities/races (45%). Dash lines represent unreported data.

Materials/ Instruments

Leisure activities questionnaire

Questions regarding leisure participation and subjective evaluation of participation in leisure activities were created by the author for this study. At the start of the study, leisure activities were defined for participants and a list of common activities was provided for them to refer to while completing the initial questions. Leisure activities were defined as recreational activities or hobbies that individuals participated in outside of the hours of work or school. We used one item to measure the frequency of participation in leisure activities: during periods of social isolation, how often did you engage in your leisure activities (e.g., hobbies) per week? This question was answered on a five-point scale: 1 = occasionally throughout the period of social isolation, 2 = one to two times a week, 3 = three to four times a week, 4 = five to six times a week, 5 = everyday (seven times a week), 6 = more than once per day (i.e., greater than seven times a week).

Questions were created to measure the following five psychological benefits of leisure participation: social affiliation (e.g., my leisure activities have helped me meet new people through virtual platforms), personal control (e.g., my leisure activities bring me a sense of control to my life), self-efficacy (e.g., I am able to stop myself from worrying when I am engaged in my hobbies), sense of flow (e.g., I lose track of time when I am engaged in my hobbies), and sense of meaning (e.g., I feel like I am contributing to making the world a better place when I am engaging in my hobbies). The questions for each construct were mixed to avoid participants from noticing the underlying construct being measured. Each of the items used the following response scale: 5 = strongly disagree, 4 = disagree, 3= neutral, 2 = agree, 1 = strongly agree.

Coronavirus Anxiety Scale (CAS)

The Coronavirus Anxiety Scale (CAS) is a five-item scale created by Lee (2020) to measure dysfunctional anxiety associated with the COVID-19 pandemic. The items measure different ways anxiety could present itself. Specifically, behavioral (i.e., dysfunctional activities; avoidance; compulsive behaviors), physiological (i.e., sleep disturbances;
somatic distress; tonic immobility), emotional (i.e., fear; anxiety; anger), and cognitive (i.e., repetitive thinking; worry; processing biases; dreaming; planning) dimensions. For example, the item “I had trouble falling or staying asleep because I was thinking about the coronavirus” measures the physiological aspect of the anxiety. The items are all rated on a 5-point scale that assesses the frequency of the symptom over the preceding two weeks. The following response scale is used: 0 = not at all, 1 = rare, less than a day or two, 2 = several days, 3 = more than 7 days, 4 = nearly every day over the last 2 weeks. A total score or an elevated score on a specific item that is equal to or greater than 9 indicates dysfunctional coronavirus-related anxiety that might require further assessment/treatment. In this study, the CAS was used to measure participants’ anxiety level surrounding the Coronavirus. If there was a positive relationship between leisure activities and psychological well-being and resilience, we expected an inverse relationship between CAS scores and increased frequency in leisure activities participation. This would indicate that participants who were benefitting from participating in leisure activities would show a decrease in anxiety scores. The CAS has been shown to be valid and has proven to discriminate between individuals who have dysfunctional anxiety and those who do not have it (Lee, 2020).

**WHO-5 Wellbeing Index**

The World Health Organization’s (WHO-5) Wellbeing Index is a widely used five-item measure which assesses subjective psychological well-being (Topp et al., 2015). The five items measure how an individual has felt over the preceding two weeks using positively worded, non-invasive statements (e.g., I have felt cheerful and in good spirits, I have felt calm and relaxed). The following response scale is used: 5 = all of the time, 4 = most of the time, 3 = more than half of the time, 2 = less than half of the time, 1 = at no time. The score ranges from 0 to 25, with lower scores indicating worst quality of life and higher scores indicating best possible quality of life. A score of 13 is considered a poor well-being score and indicates a need for further evaluation. In this study, the WHO-5 Wellbeing Index was used to measure the psychological well-being of participants. We expected to see a positive relationship between scores on the WHO-5 Wellbeing Index and frequency of leisure participation. The WHO-5 Wellbeing Index has been shown to be valid as a screening measure for depression and as an outcome measure for clinical trials (Topp et al., 2015).

**Brief Resiliency Scale (BRS)**

The Brief Resiliency Scale (BRS) is a six-item measure created by Smith et al. (2008). The scale assesses the ability to bounce back or recover from stress, which the authors argue is the basic concept of resiliency. The following response scale is used: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.” Items 1, 3, and 5 on the scale are worded positively (e.g., “I tend to bounce back quickly after hard times”, “I usually come through difficult times with little trouble”). Items 2, 4, and 6 are worded negatively (e.g., “I have a hard time making it through stressful events”, “it is hard for me to snap back when something bad happens”). The score is calculated by dividing the total sum (ranges from 6-30) by the total number of questions answered (6). Scores ranging from 1.00 to 2.99 are interpreted as low resilience. Scores ranging from 3.00 to 4.30 are interpreted as normal resilience. Scores ranging from 4.31 to 5.00 are interpreted as high resilience. The BRS was used to assess resiliency in participants as this is part of the outcome variable for well-being. The BRS has been shown to be a reliable measure for assessing ability to recover from stress and for understanding how people are coping with health stressors (Smith et al., 2008).

**Design**

This study was mainly correlational, exploring the relationship between participation in leisure activities and psychological well-being during social isolation. There are many factors that influence psychological well-being and participation in leisure activities is one of them. A correlational study can help us determine if a relationship exists between these two variables (i.e., leisure activities and psychological wellbeing) and the possible coping mechanisms involved in this relationship.
Procedure

The study was presented in the form of an online survey and was hosted on the data management software, Qualtrics. We estimated the survey to take approximately 15-20 minutes to complete. Prior to starting the survey, the information-consent form that briefly describes the purpose of the study, confidentiality and rights of the participant, and contact information of the researcher was presented to the participant. The first section in the survey asked participants general leisure activities questions in the context of social isolation during COVID-19, including whether or not they participated in leisure activities, what activities they engaged in for leisure, the frequency and duration of their engagement, and lastly, rank order activities depending on how much time they spent on them during their period of social isolation.

The second section contained a questionnaire that measured the five psychological mechanisms that were of focus in this study. This part would allow us to determine if their leisure activities participation was providing them with a way to gain a sense of personal control, social affiliation, self-efficacy, sense of flow, and/or sense of meaning.

The third section contained three psychological measures to assess their anxiety, well-being, and resiliency. The first one is the Coronavirus Anxiety Scale (CAS) which measured participants’ levels of anxiety regarding COVID-19. This allowed us to get a better understanding of how participants were feeling about the virus and whether or not leisure activities would help decrease their anxiety. The second one is the WHO-5 Wellbeing Index which measured participants’ evaluation of their own general well-being. This was important because we wanted to understand if leisure activities had any affect on participants’ general well-being. The Brief Resiliency Scale (BRS) was used to measure participants’ level of resiliency by specifically determining their ability to ‘bounce back’ after stressful events. This will allow us to explore whether or not participants who engaged in leisure activities were more resilient to the psychological impacts of COVID-19. This section also asked participants an open-ended question regarding their opinion on how leisure activities may or may not have helped them cope during the last six months, which provided our results with a qualitative understanding of our main question.

The fourth section asked demographic questions such as age, ethnicity, the extent they have disposable income, and their gender. These aspects can help describe the data, as well as help us find similarities and differences between people. Since the survey asked students to reflect on their well-being and there is currently an ongoing pandemic, some resources were provided for participants to utilize at the end of the survey if they feel that they endured any psychological distress.

Results

Question 1: What is the Relationship Between Leisure Activities Participation and Overall Well-being?

To examine the association between leisure activities participation and overall well-being, a bivariate correlation was conducted between the frequency of leisure activities participation per week and each of the three outcome measures (WHO-5, CAS, and BRS), respectively (refer to table 2). Results indicated that there was a significant, positive relationship between frequency of leisure activities participation per week and scores on the WHO-5 Well-being Index, \( r (195) = .150, p = .035 \). This finding was consistent with our initial predictions between these two variables. Next, a significant, negative relationship was found between frequency of leisure activities participation per week and scores on the Coronavirus Anxiety Scale, \( r (195) = -.150, p = .036 \). Again, this result was consistent with our predictions. Lastly, there was not a significant relationship between frequency of leisure activities participation per week and scores on the Brief Resiliency Scale, \( r (195) = .067, p = .350 \). Interestingly, this finding was not consistent with our initial predictions, but this may be due to the two variables not being continuous. These initial results were...
further examined for supplementary understanding using a one-way analysis of variance (ANOVA) to compare mean differences between choices.

Table 2. Correlation Results for Frequency of Leisure Activities Participation (days per week) and Scores on Outcome Measures

| Leisure activities participation (days per week) | Leisure activities participation (days per week) | WHO-5 | CAS | BRS |
|------------------------------------------------|------------------------------------------------|-------|-----|-----|
| WHO-5                                            | 1                                               | .15*  | -.15* | .06 |
| CAS                                              | 197                                             | 1     | 197  | 197 |
| BRS                                               | 197                                             | 197   | 197  | 1   |

*WHO-5 = WHO Well-being Index; CAS = Coronavirus Anxiety Scale; BRS = Brief Resiliency Scale. BCa bootstrap 95% CI reported in brackets. Values below diagonal indicate sample size (N = 197). Empty cells are not applicable. *p < .05

ANOVA results indicated there were no statistically significant difference between the frequency of leisure engagement on resiliency scores (F (5, 191) = 0.62, p = .682), well-being scores (F (5, 191) = 1.76, p = .122), or anxiety scores (F (5, 191) = 1.84, p = .1.08). Despite these findings, an LSD post-hoc test was conducted to examine if there were mean differences between the frequency of leisure activities engagement and each of the outcome variables. LSD post-hoc test results indicated that the Brief Resiliency Scale scores did not differ and were not significant for participants regardless of how often they participated in leisure activities per week. This supports the result from the previous analysis, indicating that there is no significant relationship between resiliency scores and frequency of leisure activities participation per week. With regards to scores on the WHO-5 Wellbeing Index, the mean differences between some choices were significant. In particular, compared to participants who engaged in leisure activities occasionally, those who engaged ‘three to four times a week’, p = .024, SE = 1.226, 95% CI [−5.215, −.377], ‘five to six times a week’, p = .031, SE = 1.350, 95% CI [−.5.602, .276], and ‘more than once per day’, p = .015, SE = 1.476, 95% CI [−6.549, −.725] reported a significant increase on scores on the WHO-5 Well-being Index. These results support our initial predictions, indicating that engaging in leisure activities is associated with greater well-being. In addition, there were significant mean differences with regards to scores on the Coronavirus Anxiety Scale depending on the frequency of leisure activities participation per week. Specifically, compared to participants who engaged in leisure activities occasionally, those who engaged ‘three to four times a week’, p = .032, SE = .864, 95% CI [1.64, 3.575], ‘five to six times a week’, p = .043, SE = .951, 95% CI [0.61, 3.817], and ‘more than once per day’, p = .004, SE = 1.040, 95% CI [0.946, 3.503] reported a significant decrease on scores on the Coronavirus Anxiety Scale. This finding supports our initial predictions that engaging in some form of leisure activity may reduce people’s Coronavirus Anxiety.

Question 2: What Type of Leisure Activities (i.e., Physical or Nonphysical) has the Most Positive Effect on Overall Well-being?
Next, we investigated what physical or non-physical (i.e., high or low) leisure activities are having the greatest effect on well-being. To do this, we first divided the comprehensive list of hobbies that was provided to participants into physical and non-physical leisure activities categories. Table 3 lists how the activities were divided into the two categories. Some activities, such as travelling and volunteering were harder to distinguish, so they were kept as non-physical based on our understanding that they were not as physically taxing as the activities in the physical category. This process resulted in each participant receiving a physical and non-physical total score. A median split was then used to classify participants into high and low physical and non-physical activity groups, which resulted in four possible activity classifications: (1) high physical activity and high non-physical activity, (2) high physical and low non-physical activity, (3) low physical activity and high non-physical activity, and (4) low physical and low non-physical activity (figure 1). To determine which type of leisure activity has the most positive affect on well-being three separate one-way ANOVAs were run with the activity classification as the fixed factor and each of the outcome variables as the dependent measure.

Table 3. List of Leisure Activities Split into Physical and Non-physical Leisure Activities

| Physical Leisure Activities                                                                 | Non-physical Leisure Activities                  |
|---------------------------------------------------------------------------------------------|--------------------------------------------------|
| Camping                                                                                      | Volunteering                                     |
| Canoeing                                                                                     | Travelling                                       |
| Cycling                                                                                      | Baking/bread making                              |
| Dancing                                                                                      | Board/card games                                 |
| Dual sports (e.g., tennis, racquetball, chess, volleyball, table tennis)                      | Cooking                                           |
| Fishing                                                                                      | Creative writing                                 |
| Hiking                                                                                       | Do It Yourself (DIY) and Crafts                  |
| Martial Arts                                                                                 | Drawing                                          |
| Roller blading                                                                               | Journaling                                       |
| Running                                                                                      | Knitting/Quilting                                |
| Swimming                                                                                     | Language learning                                |
| Team sport (e.g., soccer, frisbee, bowling, baseball, basketball)                             | Listening to podcasts/audiobooks                 |
| Gardening                                                                                    | Makeup                                           |
| Walking (e.g., individually or with pets/family members)                                      | Memorabilia collecting                           |
| Weightlifting                                                                                | Painting                                         |
| Yoga/meditation                                                                              | Photography                                      |
|                                                                                             | Playing an instrument                            |
|                                                                                             | Puzzles                                          |
|                                                                                             | Reading                                          |
|                                                                                             | Sewing                                           |
|                                                                                             | Singing/song writing                             |
|                                                                                             | Thrifting                                        |
|                                                                                             | Video games                                      |
|                                                                                             | Videography                                      |
|                                                                                             | Watching movies/shows                            |

¹Activities were divided based on how physically taxing they were during participation and can be commonly agreed upon that they fit their respective category.
Table 4 presents the results of the one-way ANOVA. Results indicated a statistically significant difference between categories on resiliency scores as determined by the one-way ANOVA ($F(3, 191) = 2.74, p = .045, \eta^2 = .04$). An LSD post hoc test revealed that there was only a statistically significant difference between participants on resiliency scores when engaging in more non-physical activities and less physical activities compared to when engaging in less non-physical activities and more physical activities ($MD = 0.5, SE = 0.2, 95\% CI [0.01, 0.14], p = .006$). Although this was a significant finding, $\eta^2 = .04$ indicates that the effect is a small one. There were no statistically significant differences between participants on resiliency scores when engaging in any other levels of physical and non-physical leisure activities. With regards to well-being score, there was no statistically significant difference between any of the categories ($F(3, 191) = 0.66, p = .575, \eta^2 = .01$) on well-being that emerged. Lastly, with regards to anxiety scores, ANOVA results indicated that there was no statistically significant difference between the categories ($F(3, 191) = 1.84, p = .142, \eta^2 = .03$) on decreasing anxiety. The $\eta^2 = .03$ also indicates that the effects are small. However, contradictory to our predictions and previous research, the LSD post hoc test revealed that participants who engaged in more physical and more non-physical activities reported higher anxiety scores when compared to participants who engaged in less physical activities and less non-physical activities ($MD = -1.4, SE = 0.6, 95\% CI [-2.70, -0.17], p = .027$). Overall, these results indicate the only association between participation in differing levels of physical and non-physical leisure activities was on resiliency scores.

Table 4. Means, Standard Deviations, and One-Way Analyses of Variance in Hobby Categories and the Brief Resiliency Scale, WHO-5 Well-being Index, and Coronavirus Anxiety Scale

| Hobby Category | Low Physical and Low Non-Physical | Low Non-Physical and High Physical | High Non-Physical and Low Physical | High Physical and High Non-Physical | $F (1, 191)$ | $\eta^2$ |
|----------------|----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|-------------|---------|
| Measure        | $M$ | $SD$ | $M$ | $SD$ | $M$ | $SD$ | $M$ | $SD$ | $F (1, 191)$ | $\eta^2$ |
|----------------|-----|------|-----|------|-----|------|-----|------|-------------|---------|

Figure 1. Mean and Standard Error of Brief Resiliency Scale, WHO-5 Well-being Index, Coronavirus Anxiety Scale

1Mean scores on each of the well-being measure is presented for each of the four hobby categories. Error bars show standard errors.
Question 3: What Psychological Mechanisms Are Involved in Mediating the Relationship Between Leisure Activities Participation and Overall Well-being?

Eighteen questions were created to measure five psychological mechanisms that were associated with the benefits of leisure activities participation in the literature. The five original mechanisms that were created were flow, self-efficacy, personal control, sense of meaning, and social affiliation. A reliability analysis was conducted for each mechanism, but initial results indicated poor reliabilities. Reliability scores for each of the five mechanisms were as follows: flow ($n = 4, \alpha = .57$), self-efficacy ($n = 4, \alpha = .81$), personal control ($n = 4, \alpha = .67$), sense of meaning ($n = 4, \alpha = .75$), and social affiliation ($n = 2, r = .17$). As a result of these findings, an exploratory factor analysis was conducted to determine the number of factors that exist within the eighteen items that were created for the psychological mechanisms.

Results from the EFA indicated that there are four factors based on the loadings of the items and using the eigenvalue of greater than 1.00 as the cut-off. Factor 1 ($\alpha = .89$) consisted of items two, three, eight, 10, 14, 16, 17, and 18. Factor two ($\alpha = .83$) consisted of items five, six, seven, 12, and 13. Factor three ($\alpha = .50$) consisted of items one, 11, and 15. Lastly, Factor four ($r = .10$) consisted of items four and nine. The reliability statistics on these factors are significantly stronger compared to the original five factors and their composition, as this can be seen by the Cronbach’s alpha meeting the minimum standard of .50 to .80. Factor three just met the reliability minimum and factor four showed a weak, positive relationship, both indicating that they are not as strong as the other factors. Despite these findings, they were both retained for the purpose of this study as they met the eigenvalue greater than one criterion. The composition of each construct can be found on table 5 along with their factor loadings. For these new factors, we chose to name them meaning and stability (factor one), positive affect (factor two), flow (factor three), and social connection (factor four) based on the items that comprise them. These four variables were then used as mediator variables in the mediation analysis we ran using regression.

| Psychological Mechanisms Item | Factor loading |
|-------------------------------|----------------|
| **Factor 1: Meaning and Stability ($\alpha = .89$)** |               |
| 3. I feel like I am contributing to making the world a better place when I engage in my hobbies | .76 |
| 16. My hobbies help me feel like I can handle anything that comes my way. | .76 |
| 17. My hobbies help me gain a sense of value that is deeper than superficial aspects. | .74 |

$^1 N = 197$. BRS = Brief Resiliency Scale; WHO-5 = WHO-5 Wellbeing Index; CAS = Coronavirus Anxiety Scale.

*p < .05*
18. My hobbies help remind me that my failures do not stop me from getting up and trying again. .74
14. My hobbies give me the confidence I need to believe in my abilities to finish projects I have started. .68
8. I feel like I am a part of something bigger than myself when I am engaged in my hobbies. .68
10. My hobbies give me the confidence I need to believe in my abilities to do something. .67
2. My leisure activities bring me a sense of control to my life. .42

**Factor 2: Positive Affect (α = .83)**

5. I am able to stop myself from worrying when I am engaged in my hobbies. .77
6. My thoughts are focused on what I am doing in the moment when I am engaged in my hobbies. .73
13. I feel myself in a state of tranquility (e.g. my mind is at peace) when I am engaged in my hobbies. .71
7. My leisure activities allow me to cope with life’s challenges and obstacles. .69
12. My leisure activities allow me to deal with unpleasant feelings such as anger, sadness, and fear. .64

**Factor 3: Flow (α = .50)**

15. People have a hard time getting my attention when I am engaged in my hobbies. .78
11. I lose track of time when I am engaged in my hobbies. .58
1. I feel that my hobbies bring me just the right amount of challenge for my abilities. .53

**Factor 4: Social Connection (r = .17)**

4. My leisure activities have helped me meet new people through virtual platforms -.63
9. My leisure activities have helped me connect with the people in my immediate family. .50

\(^1\text{N} = 200. \) The extraction method was a principal component analysis with an orthogonal (varimax with Kaiser normalization) rotation. Factor loads above .30 are bolded. \( \alpha \) is presented for factors 1, 2, and 3. \( r \) is presented for factor 4 due to having only two items.

To answer this question, we chose to use Preacher and Hayes' (2004) simple mediation method for estimating indirect effects and then using Hayes (2013) PROCESS tool to test if the effect is significant with bootstrap samples of 5000. To begin, we assessed the effects of each of the four mediators (i.e., meaning and stability, positive affect, flow, and social connection) on the relationship between frequency of leisure activities participation and scores on the Brief Resiliency Scale score. Results showed that there was no indirect effect of frequency of leisure activities participation on well-being through meaning and stability, \( b = .00, 95\% \text{ BCa CI [-.016, .016]} \), positive affect, \( b = .00, 95\% \text{ BCa CI [-.010, .017]} \), flow, \( b = -.01, 95\% \text{ BCa CI [-.026, .004]} \), or social connection, \( b = .00, 95\% \text{ BCa CI [-.016, .016]} \).
This finding was not surprising considering our findings from question one indicated that there were no associations between resiliency and frequency of leisure activities participation, so we did not foresee this relationship to indicate an effect of mediation.

Moreover, we assessed the effects of each of the four mediators on the relationships between frequency of leisure activities participation and scores on the WHO-5 well-being index and, again, results indicated no indirect effect through mean and stability, $b = .01$, 95% BCa CI [-.189, .187], positive affect, $b = .03$, 95% BCa CI [-.044, .133], flow, $b = -.04$, 95% BCa CI [-.168, .065], or social connection, $b = .00$, 95% BCa CI [-.054, .073]. These results indicate that there are no effects of a mediator between this relationship, which is surprising considering the significant direct relationship found between frequency of participation in leisure activities and well-being in question one. However, it should be noted that this relationship showed a trend towards an indirect effect when flow was the mediator, indicating that it should not be overlooked. For instance, path a (frequency of leisure activities participation and flow) indicated $b = .21$, $p = .004$ and path b (frequency of leisure activities participation and flow, and well-being) showed $b = .15$, $p = .043$, which was each significant at the $p < .05$ level. However, the overall indirect effect was not significant based on bootstrapped results. In addition, this factor had an $\alpha = .50$, which is not a strong indication of reliability, so this may be a factor for why there was not an indirect effect.

For the anxiety outcome, the results were similar to the other two outcomes, indicating no indirect effect between participation in leisure activities and scores on the Coronavirus Anxiety Scale through meaning and stability, $b = .00$, 95% BCa CI [-.066, .062], positive affect, $b = -.07$, 95% BCa CI [-.211, .003], flow, $b = .06$, 95% BCa CI [-.018, .156], or social connection, $b = -.00$, 95% BCa CI [-.033, .030]. This finding was also surprising due to the finding from previous analyses which indicated that the frequent participation in leisure activities was associated with decreased anxiety, so it was plausible that at least one of the mediators would have helped explain how it has helped participants decrease their anxiety. Nonetheless, these results demonstrated that there are no mediating factors between this relationship.

Discussion

Participation in Leisure Activities Associated with Decreased Anxiety and Increased Well-being

With regards to our first question, we predicted a positive relationship between the frequency of leisure activities participation and overall well-being, which was demonstrated by low scores on the CAS and high scores on the BRS and WHO-5 (hypothesis two). Results partially supported our prediction, indicating that the more individuals engaged in a leisure activity, the lower their anxiety was surrounding the virus and the greater their subjective sense of well-being. However, there was no association between frequency of leisure activities participation and resiliency scores, indicating that how often individuals engaged in leisure activities had no effect on how resilient they are overall. Although, there have been some research that have demonstrated a positive relationship between leisure activities and resilience (i.e., Chow & Choi, 2019; Denovan & Macaskill, 2017), the findings were not as strong as other factors, such as increased ability to self-regulate (Wong et al., 2018), the number of stressful life events, supportive relationships (DuMont et al., 2007), and high child IQ (Pargas et al., 2010). Our study seems to be consistent with these findings, indicating an extremely low, non-significant, positive relationship. Future research should attempt to focus specifically on leisure activities participation and resiliency to determine the relationship that truly exists. Supplementary analysis demonstrated that participants who engaged in leisure activities for a minimum of three times a week showed an increase in subjective sense of well-being and decreased anxiety around the pandemic. These findings indicate that increasing participation in leisure activities may be a plausible way to help decrease anxiety and increase well-being during this period and/or future stressful periods. However, future research should experimentally test this finding by creating conditions with varying levels of leisure activities participation and measuring well-being to truly make a causal inference.
Increased Participation in Non-physical Leisure Activities Indicate Increased Resiliency

Next, we explored the type of activities that were most associated with well-being. With this question, we created high and low levels of physical and non-physical leisure activities to explore if participating more or less of one type activity is beneficial than the other, or both. We predicted that participants who engaged in more physical activities and less non-physical leisure activities would show an association with higher scores on the WHO-5, BRS, and lower scores on the CAS (hypothesis two). Results did not support our predictions, showing association for only the resiliency outcome when participants were engaged in more non-physical leisure activities and less physical leisure activities. This finding demonstrated that non-physical leisure activities (i.e., watching movies/show, drawing, playing videogames, etc.) were more helpful to participants at increasing their resiliency scores. Although the literature on resiliency and non-physical leisure activities is sparse, some studies have demonstrated that they can provide positive benefits, such as feelings of excitement, purpose, social connection, and regulating emotions (Conner et al., 2018; Chin & Rickard, 2014). These benefits can act as protective barriers against the negative impacts of stressful life events, which can help to increase resiliency (Denovan & Macaskill, 2017). Although this result was a simple correlation and no concrete conclusions can be made regarding why this relationship exists, the literature does support that there may be benefits that participants were attaining from engaging in the non-physical leisure activities. With regards to the low physical activities finding, it may also be possible that participants may not have had opportunities to engage in as much due to the government restrictions on social distancing and outdoor activities being limited, contributing to their low score. However, it could also be that they preferred to participate in the non-physical leisure activities.

In addition, results showed that there were no mean differences on the subjective well-being measure between any of the hobby categories. This did not support our predictions, but it may mean that (with the understanding of our first hypothesis) it is not so much about the type of activities participants are engaging in, but that they are engaging in activities that is the most important to increasing their sense of well-being. Previous literature has indicated that both physical and non-physical are helpful in increasing well-being, so it may not matter which type of activity they are engaging in more than the other in order to get the benefits of well-being. The results for the anxiety measure were the same as well-being, indicating no relationship. However, there was a significant finding with additional analysis, which suggested that participants who engaged in more physical and more non-physical activities reported higher anxiety scores when compared to participants who engaged in less physical activities and less non-physical activities. We have two possible explanations for this finding. First, it is possible that there may be no difference in the means of the hobby categories when it comes to decreasing participants’ anxiety around the coronavirus, but for participants with higher anxiety, they possible have realized that they are not doing well and may be engaging in more activities (physical and non-physical) to feel better. Second, it is also possible that the secondary analysis is a false positive as a result of the method that was chosen. LSD post hoc test is commonly used when there are three groups in the test, but this study has four hobby groups, which may decrease its ability to protect against type 1 error (Howell, 2010). Future studies should address this by using other post-hoc tests to compare means, such as Tukey’s test, for better control in family-wise error.

Possibility of Sense of Flow as a Mediator

Thus far, the study has demonstrated that engaging in frequent leisure activities helps to increase well-being and decrease anxiety around the coronavirus, with the exception of increasing resiliency. In addition, it has demonstrated that resiliency was most associated with participants who engaged in more non-physical activities and less physical activities. Although helpful for our understanding, these findings cannot truly answer the question of what mechanisms are mediating this relationship. In other words, how is participating in a leisure activity associated with overall well-being. For this reason, we explored the psychological mechanisms that are most associated with the greatest overall well-being. The literature has shown various mechanisms that are involved in why leisure activities are beneficial, but
for the purpose of this study, we focus on five that were commonly found in the literature: personal control, self-efficacy, sense of meaning, social affiliation, and sense of flow. Due to the possibility of any of these mechanisms being strongly associated with overall well-being, we chose to remain uncertain about which one would be most associated with overall well-being (hypothesis three). As mentioned, the initial items created to measure each of these constructs did not show strong reliability. This may be viewed as a major weakness of this study, since prior test for reliability would have shown this result before starting the study. We acknowledge this issue and suggest future research should use already existing items in the literature that measure these constructs or create reliable items that can better measure these constructs. For this study to continue, we analysed the questions we created and found there to be four factors that showed stronger validity, which we newly named meaning and stability, positive affect, flow, and social connection.

We ran a simple mediation analysis between each of the three outcome measures (BRS, WHO-5, and CAS) and the four mediation variables, respectively. The results indicated that there were no mediating effects of any of the four factors on the relationship between frequency of participation in leisure activities and individual’s resiliency, sense of well-being, or on their anxiety surrounding the coronavirus. This was a surprising finding due to the support of the previous analyses and the literature, which indicated that there could be a plausible indirect effect of on

Despite these findings, there was a notable trend with regards to flow and the relationship between leisure activities participation and well-being. In other words, the data seemed to indicate that sense of flow may be a possible reason for the increase in well-being. This trend was demonstrated with participants’ replies to the question “...When you reflect on the last six months, do you feel your leisure activities have helped you cope in any way? If so, in what ways?” When examining participants who reported higher levels of flow (scores between 4-5), their responses had elements that are associated with being in a state of flow, such as feeling lost in the moment (i.e., distracted by the activity, mentally escaping the world around), feeling in control during a task, and feeling intrinsically motivated. For example, one participant replied, “Yes it did, it helped me forget the world around me and enjoy what is at hand. It also helped me appreciate everything and everyone in my life.” Another participant replied, “Yes, I feel that my leisure activities have helped me cope in any way. I am able to somewhat fight depression during this quarantine season. It somehow feels like I’m back to the normal world when doing my leisure activities.” These replies demonstrated that participation in leisure activities has been able to provide a distraction, help participants feel intrinsically motivated to participate because they are better able to appreciate their life and the people in their life, and also be a way to feel in control in order to cope with mental illness (Nakamura & Csikszentmihalyi, 2014). This is a promising support that participation in leisure activities can help individuals feel a greater sense of well-being during the stressful period of the current pandemic.

It should be noted as well that participants who reported lower levels of flow (scores between 1-2) also indicated that they received these benefits, but it often was not enough to help for so long. For example, a participant replied, “They’ve filled my time but there’s only so much that can help when you don’t leave your apartment for months on end.” Another participant similarly replied, “They have but at this point there is no activities that will help me feel better until they open the world back up as it was designed.” Others seem to just feel distracted, but it has not helped with coping with stress, “They’ve haven’t really help me cope with more stress. It’s more like they’ve distracted me from the stress.” These results indicated that feeling distracted for a short period of time during participation in activities was not enough for some individuals to increase their sense of well-being, especially for a long period of time or when they have more severe levels of stress. Together, these findings do demonstrate flow as a promising mechanism for why majority of individuals were feeling a greater sense of well-being, but there are aspects of the current pandemic that may make it difficult for some to receive the full benefits. As mentioned previously, the flow factor was on the lower end of the minimum power criteria (.50), so this may have influenced the significance of this factor as a mediator. Future research should focus on the power for this factor and attempt to analyse if this is a mediator in the relation, in addition to the other factors that were a focus in this study, such as meaning and stability, positive affect, and social connection. Also, there may be a possible area of research with examining other factors, such as physiological effects, as a possible mediating factor between leisure activities participation and overall well-
being because the literature indicates that physical leisure activities can increase well-being by helping decrease symptoms of depression and increasing emotional regulation (Bailey et al. 2016; Chen et al., 2012; Parker et al., 2016; Stubbe et al., 2007).

Conclusions

In conclusion, this study has demonstrated that there is a relationship between engagement in leisure activities participation and overall well-being, indicating that increased participation in leisure activities during a stressful period may be a plausible way to decrease anxiety and increase sense of well-being. In addition, it seems that those who engaged in more non-physical leisure activities, such as watching movies or journaling, were showing greater levels of resiliency scores. Exactly what the mechanisms for these benefits are not clear and results seem to indicate that sense of flow may be a plausible way, but more research is needed to make a firm conclusion. Despite these findings, results suggest that an engagement in some sort of hobby can help participants in some ways during the stress of this pandemic.

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