Regular Exercise Is Associated With Better Mental Health During COVID-19 Pandemic: A Unique Example in Taiwan

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic has had a considerable adverse effect on individuals’ lifestyles and physical and mental health. The pandemic has resulted in a deterioration in mental health and a substantial decrease in physical activity worldwide. The benefits of physical activity on mental health have been well documented and thus one may deduce the decrease in physical activity has exacerbated the decline in mental health during the pandemic.

The Taiwanese government did not enforce a lockdown and thus Taiwan can be regarded as a unique case study of the COVID-19 pandemic. Rather, the Taiwanese government implemented measures such as strict social distancing, quarantine, the mandatory wearing of face masks in public, and measurement of body temperature at all entrances to buildings. It is believed that these measures contributed to the country recording only 16,662 infections, including 848 deaths, from COVID-19 as at December 6, 2021.

Consequently, 71.6% of Taiwanese adults perceived that the pandemic had not disrupted their lives. Accordingly, the purpose of this study was to examine the effects of physical activity on mental health before and during the COVID-19 pandemic in this unique environment.

Methods

Data were obtained from the 2020 Panel Study of Family Dynamics, a longitudinal survey conducted by Academia Sinica, Taiwan. The survey was conducted in person or online from January 6 to May 19, 2020. While the data collected before January 21, the date of the first reported COVID-19 case in Taiwan, were classified as occurring before the outbreak, the data collected on or after January 22 were classified as after the outbreak. The original data were collected from 5806 participants. The final analysis included 5106 respondents, specifically, 2483 before and 2623 after the outbreak. The study protocol was approved by the Institutional Review Board on Humanities and Social Science Research, Academic Sinica, Taiwan (AS-IRB-HS07-108120). The respondents provided either verbal or written informed consent.

Five questions that assessed respondents’ feelings of satisfaction, relief, calmness, happiness, and security were selected as indicators for mental health because of their inclusion in the Chinese version of the State-Trait Anxiety Inventory. The questions were rated on a 4-point scale, ranging from 1 (almost never) to 4 (almost always). The responses were dichotomized as positive (almost always/usually) or negative (almost never/sometimes).

To assess exercise behavior, respondents were asked how many times on average they exercised a week and on average how long they exercised during each session. Those who exercised at least three times a week for at least 30 minutes were classified as exercising regularly.

Differences between the before and after subsamples were analyzed using an independent t test or χ² test. Multivariate logistic regression models were fitted to determine the association between regular exercise and the mental health variables (satisfied, relieved, calm, happy, and secure). All analyses were performed using STATA 16.0 software (StataCorp, College Station, TX, USA).

Results

After the COVID-19 outbreak, the average duration of exercise increased significantly by 3.32 minutes (Table 1). The number of respondents who felt happy and secure after the outbreak was significantly higher than that prior to the outbreak. Furthermore, regular exercise was associated significantly with positive feelings in each of the five mental health variables before and after the outbreak and in both samples, with the exception of feeling calm before the outbreak (Table 2).

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Table 1. Descriptive Statistics of the Variables Relating to All the Respondents and Subgroups Before and After the COVID-19 Outbreak.

| Variable                        | All (n = 5106) | Before outbreak (n = 2483) | After outbreak (n = 2623) | p value |
|---------------------------------|----------------|----------------------------|---------------------------|---------|
| **Mental health**               |                |                            |                           |         |
| Satisfied (%)                   | 39.68          | 40.72                      | 38.70                     | .140    |
| Relieved (%)                    | 53.35          | 53.56                      | 53.15                     | .764    |
| Calm (%)                        | 58.09          | 57.55                      | 58.60                     | .449    |
| Happy (%)                       | 63.02          | 61.30                      | 64.66                     | .013    |
| Secure (%)                      | 54.37          | 52.76                      | 55.89                     | .025    |
| **Exercise behavior**           |                |                            |                           |         |
| Exercise frequency (times/week) | 1.81 ± 2.44    | 1.82 ± 2.53                | 1.80 ± 2.35               | .806    |
| Exercise duration (min per session) | 30.70 ± 42.08 | 29.00 ± 38.83              | 32.32 ± 44.89             | .005    |
| Regular exercise (%)            | 26.32          | 26.50                      | 26.15                     | .778    |
| **Demographic characteristics** |                |                            |                           |         |
| Age, y                          | 32.68 ± 13.68  | 33.04 ± 13.41              | 32.33 ± 13.28             | .057    |
| Male (%)                        | 53.41          | 50.26                      | 56.39                     | <.001   |
| Married (%)                     | 56.37          | 56.79                      | 55.97                     | .555    |
| **Socioeconomic characteristics**|                |                            |                           |         |
| Junior high school or below (%) | 12.61          | 13.05                      | 12.20                     | .361    |
| Senior high school (%)          | 32.20          | 30.29                      | 34.01                     | .004    |
| Some college or higher (%)      | 55.19          | 55.66                      | 53.79                     | .039    |
| Employed (%)                    | 78.46          | 77.53                      | 79.34                     | .116    |
| Monthly income (NT$10,000)      | 5.98 ± 14.06   | 6.28 ± 15.96               | 5.69 ± 11.99              | .139    |
| **Health status**               |                |                            |                           |         |
| Body mass index                 | 24.61 ± 4.31   | 24.56 ± 4.32               | 24.66 ± 4.30              | .407    |

Values are presented as mean ± standard deviation or percentages.

*Regular exercise refers to exercise at least three times a week for at least 30 minutes per session.

Table 2. Logistic Regression Analysis of the Association Between Regular Exercise and Mental Health.

| Mental health | Variable       | All (n = 5106) | Before outbreak (n = 2483) | After outbreak (n = 2623) |
|---------------|----------------|---------------|---------------------------|---------------------------|
| Satisfied     | Regular exercise | 1.26 [1.09, 1.46]* | 1.23 [0.99, 1.52] | 1.29 [1.05, 1.57]* |
|               | No regular exercise | 1.00          | 1.00                      | 1.00                      |
| Relieved      | Regular exercise | 1.45 [1.25, 1.68]* | 1.44 [1.16, 1.79]* | 1.46 [1.20, 1.78]* |
|               | No regular exercise | 1.00          | 1.00                      | 1.00                      |
| Calm          | Regular exercise | 1.26 [1.09, 1.46]* | 1.15 [0.93, 1.43] | 1.38 [1.12, 1.69]* |
|               | No regular exercise | 1.00          | 1.00                      | 1.00                      |
| Happy         | Regular exercise | 1.32 [1.13, 1.54]* | 1.18 [0.95, 1.48] | 1.46 [1.18, 1.80]* |
|               | No regular exercise | 1.00          | 1.00                      | 1.00                      |
| Secure        | Regular exercise | 1.28 [1.10, 1.48]* | 1.21 [0.98, 1.50] | 1.35 [1.10, 1.65]* |
|               | No regular exercise | 1.00          | 1.00                      | 1.00                      |

Abbreviations: OR = odds ratio; CI = confidence interval.

*Adjusted for age, sex, marital status, education level, employment status, income, and health status.

*P < .05.

**Discussion**

This study suggested that regular exercise was associated significantly with feeling satisfied, relieved, calm, happy, and secure during the pandemic. The results further revealed the critical role of physical activity in mental health before and after the COVID-19 pandemic. Similarly, an international online survey found that adults who maintained or increased their physical activity levels during the pandemic enjoyed enhanced mental health and well-being.7 Physical activity may provide a distraction from the stress and uncertainty associated with the pandemic as
well as help individuals to establish a daily routine and sense of control. 8 It is noteworthy that the respondents who maintained their physical activity levels during the pandemic were more motivated by mental health outcomes, including anxiety relief and stress reduction, than physical health outcomes, such as weight loss and improving strength. 9

**Conclusion**

Physical activity has become even more critical for enhancing mental and physical health during the COVID-19 pandemic. The promotion of home-based physical activity combined with mobile technology may be an effective strategy for alleviating mental and physiological burdens during pandemics.

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