Original Article

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Impact of Running on Physical and Mental Health and Life Satisfaction

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Objective: Running is widely acknowledged as a highly effective form of exercise that provides numerous health benefits, including improved cardiovascular health and mental well-being. This study examined the impact of running on individuals' physical health, mental health, work productivity, and life satisfaction.

Methods: A total of 457 participants who completed questionnaires from the Kaohsiung Marathon Federation in June 2024 were included in the study.

Results: The majority of the participants were aged between 45 and 54 years (46.6%) and had been running for more than 5 years (36.3%). Most of the participants reported running once per week (37.2%), with a preferred duration of 30 – 60 minutes per session. Muscle strain was the most frequently reported injury. Running improved physical condition, weight loss, cardiopulmonary function, mental health, work productivity, and life satisfaction. Participants who ran three to four times per week had significantly more favorable physical health, muscle endurance, emotional well-being, work effectiveness and productivity, and life satisfaction compared with those who ran only once per week.

Conclusions: Running led to improvements in physical and mental health, work productivity, and life satisfaction. Participants who ran three to four times per week experienced significantly greater benefits in these areas compared with those who ran only once per week.

Key words: running, physical health, mental health, work productivity, life satisfaction

Introduction

Running is widely recognized as a highly effective form of exercise that provides various health benefits, including enhanced cardiovascular health and improved mental well-being. It is a versatile activity enjoyed by individuals of all age groups and fitness levels.[1-3]

Public health guidelines recommend that adults engage in 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous activity per week. Running is a key example of moderate to vigorous physical activity within these guidelines.[4] Running is associated with considerable potential public health benefits. Specifically, studies have indicated that running is associated with a 23%

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– 30% reduction in cardiovascular, cancer-related, and overall mortality, irrespective of the duration of running.[2,5-7]

Studies have suggested that increased participation in running could lead to substantial enhancements in both lifespan and quality of life at the population level. In addition to its physical health benefits, running has been demonstrated to positively affect mental health, with evidence indicating that running at any intensity can enhance mood and overall mental well-being.[8,9] However, few studies have explored the comparative effects of running once versus three to four times per week on physical health, mood, mental health, work productivity, and life satisfaction. Accordingly, the present study investigated the impacts of running on individuals' physical health, mood, mental health, work productivity, and life satisfaction. The findings revealed that running improved physical and mental health, work productivity, and life satisfaction. Furthermore, participants who ran three to four times per week exhibited significantly greater improvements in physical and mental health, work productivity, and life satisfaction compared with those who ran only once per week.

Patients and Methods

Participants

This study enrolled 457 individuals who participated in the Kaohsiung Marathon Federation and completed questionnaires in June 2024. Participants aged more than 18 years were included. The participants were required to have a minimum of 6 months of running experience. This study applied a cross-sectional design and administered questionnaires to the participants. The participants were divided into two groups on the basis of running frequency: group 1 comprised participants who ran once per week, and group 2 comprised those who ran three to four times per week.

Measures

The participants provided their demographic information, including age and sex, and details related to their running habits, such as duration of running experience, weekly running frequency, duration per run, whether they ran alone or with others, feelings of fatigue from running, and consideration of stopping running. Functional measures included self-reported data on injuries, muscle endurance, emotion and stress levels (categorized as significant improvement, no change, slight deterioration, and significant deterioration), sleep quality (improved, no change, and worsened), work effectiveness and productivity (worse, no change, sometimes better, and always better), and life satisfaction (very positive, positive, and neutral).

Statistical analysis

Categorical variables were compared using a chi-squared test and are presented as numbers (percentages). Continuous variables were compared using Student's t test and are expressed as means and standard deviations. A p value of < 0.05 was considered statistically significant. All analyses were conducted using SPSS software (version 23.0; Chicago, IL, USA).

Results

Baseline demographic characteristics

The baseline demographic characteristics of the participants are presented in Table 1. Participants aged between 45 and 54 years constituted the majority of the study sample (46.6%), followed by those aged 55 – 64 years (29.8%). Moreover, participants who had been running for more than 5 years constituted the largest proportion of the study sample (36.3%), followed by those who had been running for 2 – 5 years (23.6%). Participants who ran once a week represented the largest proportion of the sample (37.2%), followed by those who ran

Table 1. Demographic data of all participants.

Characteristics	Total (n = 457)
Sex	
Male	296 (64.8)
Female	161 (35.2)
Age (years)	
18 – 24	3 (0.7)
25 – 34	21 (4.6)
35 – 44	75 (16.4)
45 – 54	213 (46.5)
55 – 64	136 (29.8)
> 65	9 (2.0)
Underlying disease	
Hypertension	66 (14.4)
Dilates mellitus	48 (10.5)
Hyperlipidemia	81 (17.7)
Obesity	258 (56.5)
Period of run (year)	
< 0.5	95 (20.8)
0.5 – 1	31 (6.8)
1 – 2	57 (12.5)
2 – 5	108 (23.6)
> 5	166 (36.3)
Frequency (times/week)	
1	170 (37.2)
2	98 (21.4)
3 – 4	85 (18.2)
5 – 6	86 (18.8)
7	20 (4.4)
Duration per run (hour)	
< 0.5	95 (20.8)
0.5 – 1	300 (65.6)
1 – 2	59
> 2	3 (0.7)
Run with others	
Run together	61 (13.3)
Run along	153 (33.5)
Both	243 (53.2)
Tired of running	
Yes	222 (48.6)
No	237 (51.4)
Consider to stop running	
Yes	179 (48.6)
No	278 (51.4)

twice a week, with daily runners constituting the smallest proportion. Most participants preferred running for 30 – 60 minutes per session, with considerably fewer opting to run for more than 60 minutes. The majority of the participants enjoyed running either alone or with others, and a significant proportion preferred running alone. Running together with others was the least preferred option among the participants. Half of the participants reported experiencing fatigue from running, and one-third had considered stopping, whereas two-thirds had not contemplated ceasing their running routine.

Impact of running on physical and mental health, work productivity, and life satisfaction

Muscle strain was the most common injury reported by participants, followed by joint pain and tendinitis (Fig. 1A). Regarding physical health, an overall improvement in physical condition was the most frequently reported benefit, followed by increased lung capacity, weight loss, and enhanced cardiovascular health (Fig. 1B). In terms of muscle endurance, improvements in cardiopulmonary function were most commonly noted, followed by enhanced endurance, increased muscle strength, and improved flexibility (Fig. 1C). Furthermore, 91% of the participants reported that running engendered slight or considerable improvements in emotional well-being (Fig. 1D). However, 78.1% of the participants reported considerable or slight increases in stress levels (Fig. 2A). Sleep quality was improved in two-thirds of the participants (Fig. 2B). Concerning work productivity, 89% of the participants reported significantly increased focus and productivity (Fig. 2C). Regarding life satisfaction, 96.3% of the participants reported feeling happy (Fig. 2D).

Difference between running once and three to four times per week

We assessed differences in physical health, emotional well-being, stress levels, sleep quality, work effectiveness and productivity, and life satisfaction between participants who ran once per week and those who ran

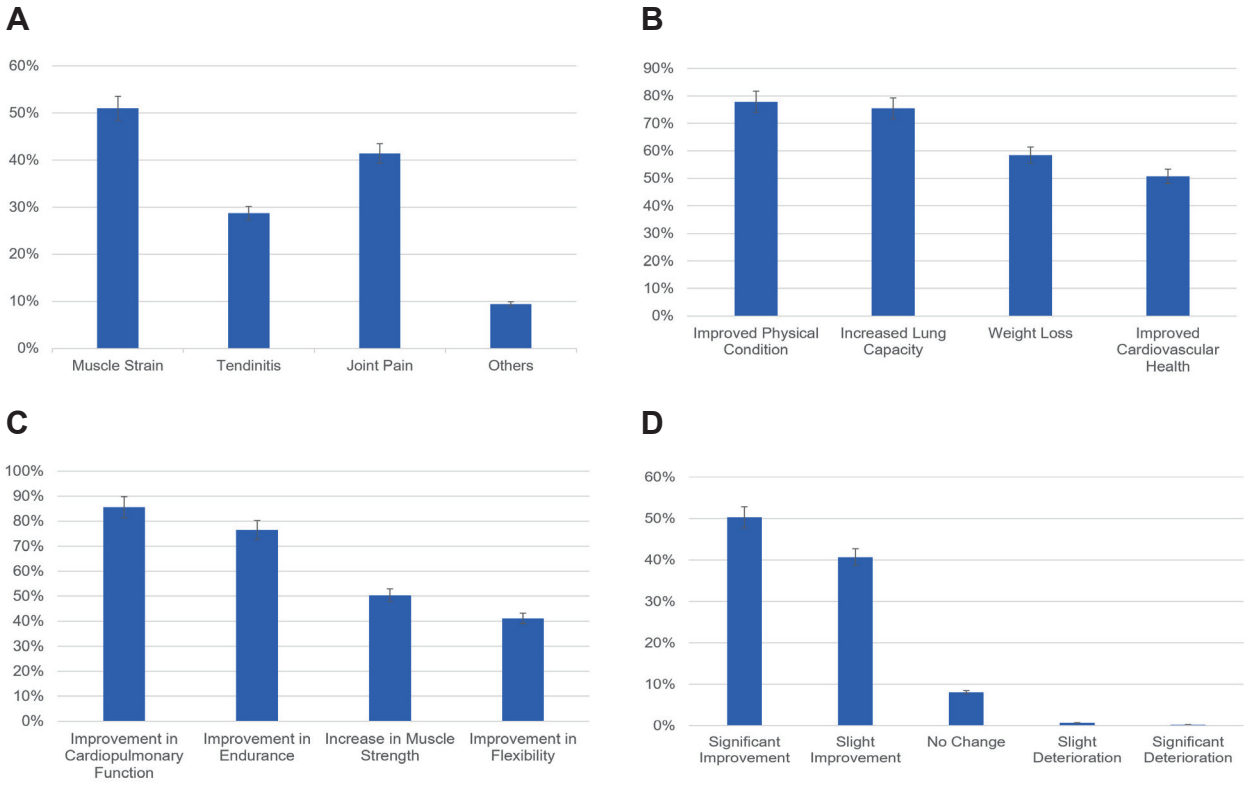

Fig. 1 Effects of running on physical and mental health. (A) Injuries caused by running. (B) Effect on physical health. (C) Effect on muscle endurance. (D) Effect on mental health.

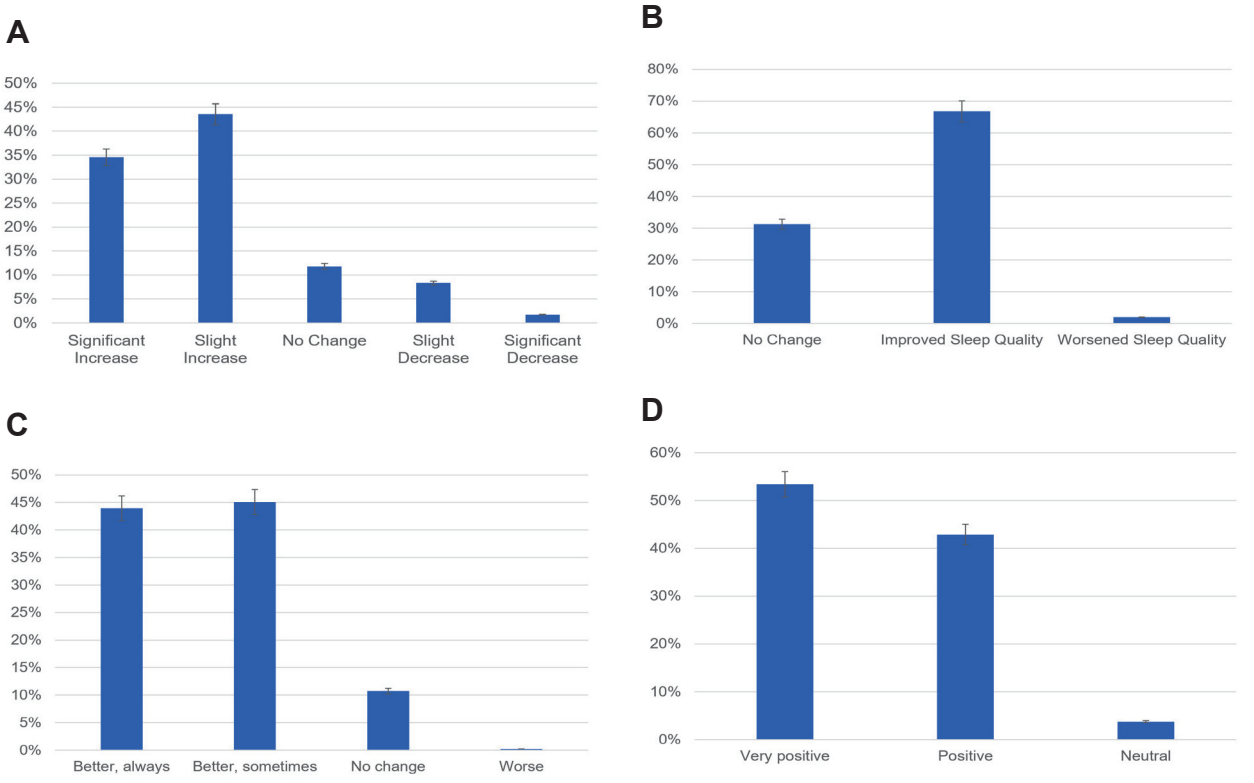

Fig. 2 Effects of running on mental health, work productivity, and life satisfaction. Running promoted mental health (A and B), work productivity (C), and life satisfaction (D).

three to four times per week. Participants who ran three to four times per week demonstrated significantly greater improvements in physical health, muscle endurance, emotional well-being, work effectiveness and productivity, and life satisfaction compared with those who ran only once per week (Table 2).

Discussion

This study investigated the impact of running on physical health, mental health, work effectiveness and productivity, and life satisfaction. A total of 457 participants from the Kaohsiung Marathon Federation who completed questionnaires were included in the analysis. The study findings indicate that running significantly enhanced physical health, promoted weight loss, improved cardiopulmonary function, and boosted mental health, work productivity, and life satisfaction. Participants who ran three to four times per week demonstrated significantly more favorable physical and mental health, work productivity, and life

Table 2. Compare the health and function between one and three-four times running weekly.

Characteristics	Group 1	Group 2	*p*-value
	One time weekly (n = 170)	3 – 4 times weekly (n = 83)	
Changes in physical health			
Improved physical condition	118 (69.4)	62 (74.7)	0.048
Increased lung capacity	122 (71.8)	67 (80.7)	0.006
Weight loss	81 (47.6)	52 (62.7)	< 0.001
Improved cardiovascular health	68 (40.0)	43 (51.8)	0.002
Improvement in muscle endurance			
Cardiopulmonary function	136 (80.0)	73 (88.0)	0.007
Endurance	124 (72.9)	72 (86.7)	< 0.001
Muscle strength	65 (38.2)	47 (56.6)	< 0.001
Flexibility	67 (39.4)	48 (57.8)	< 0.001
The impact of your emotion			
Significant improvement	68 (40.0)	46 (55.4)	< 0.001
Slight improvement	85 (50.0)	14 (16.9)	
No change	14 (8.2)	7 (8.4)	
Slight deterioration	2 (1.2)	0 (0)	
Significant deterioration	1 (0.6)	0 (0)	
The impact of stress level			
Significant decrease	1 (0.6)	1 (1.2)	0.195
Slight decrease	19 (11.2)	6 (7.2)	
No change	24 (14.1)	8 (9.6)	
Slight increase	90 (52.9)	35 (42.2)	
Significant increase	42 (24.7)	33 (39.8)	
Sleep quality			
No change	58 (34.1)	23 (27.7)	0.237
Improved sleep quality	111 (65.3)	58 (69.9)	
Worsened sleep quality	1 (0.6)	2 (2.4)	
Effective work and better productivity			
Worse	0 (0)	1 (1.2)	< 0.001
No change	24 (14.1)	5 (6.0)	
Better, sometimes	84 (49.4)	34 (41.0)	
Better, always	62 (36.5)	43 (51.8)	
Life satisfaction			
Very positive	70 (41.2)	49 (59.0)	< 0.001
Positive	92 (54.1)	32 (38.6)	
Neutral	8 (4.7)	1 (2.4)	

satisfaction compared with those who ran only once per week. This study is the first to reveal that the participants engaging in more than 150 minutes of running per week experienced significantly more favorable physical and mental health, work productivity, and life satisfaction compared with those who ran for < 30 minutes per week.

For optimal physical and mental health, individuals should consistently engage in physical activity daily.[4] Running is classified as a moderate-to-vigorous-intensity exercise. Research has demonstrated that running can lead to a 23% – 30% reduction in the risks of cardiovascular disease, cancer, and overall mortality.[2,5-7] The current study demonstrated that running enhanced physical health, promoted weight loss, improved cardiopulmonary function, and boosted mental health, work productivity, and life satisfaction. Furthermore, the participants who ran three to four times per week exhibited significantly more favorable physical and mental health, work productivity, and life satisfaction compared with those who ran only once per week.

Health guidelines recommend that adults should engage in at least 150 minutes of moderate-intensity physical activity per week to maintain optimal physical and mental health.[4] The present study revealed that participants who ran for > 150 minutes per week experienced significantly more favorable physical and mental health, work productivity, and life satisfaction compared with those who ran for < 30 minutes per week. Specifically, participants who ran three to four times per week exhibited significant improvements in cardiopulmonary function, reduced body weight, increased muscle endurance, more effective emotional regulation, increased work effectiveness and productivity, and increased life satisfaction.

In summary, running improved physical health, facilitated weight loss, improved cardiopulmonary function, and boosted mental health, work productivity, and life satisfaction. Participants who ran three to four times per week exhibited significantly more favorable physical health, muscle endurance, emotional well-being, work effectiveness and productivity, and life satisfaction compared with those who ran only once per week.

Author Contributions

Meng-Wei Hsieh, Sheng-Chi Tsai, Yu-Jen Hsieh, and Chih-Wen Lin conceived of the presented idea and study design. Meng-Wei Hsieh and Sheng-Chi Tsai had data collection, statistical analysis, and data interpretation. Meng-Wei Hsieh and Chih-Wen Lin wrote the manuscript. Chih-Wen Lin supervised the work. All authors have read and agreed to the published version of the manuscript.

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Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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