International Journal of Occupational and Environmental Medicine

The Effects of A 7-Minute HIIT Workout on Stress and Burnout in Outpatient Physical Therapists

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Abstract

Physical therapists (PTs) experience stress and burnout due to high job and productivity demands. Exercise can assist in decreasing stress and burnout, but finding the time to exercise can be difficult. This study examined the effects of a 28-day, 7-minute, high intensity interval training (HIIT) workout on PT's stress and burnout levels.

In this quasi-experimental pretest-posttest design, the Perceived Stress Scale, Maslach Burnout Inventory, grip strength, Functional Reach Test, and VO_{2max} measures were administered on day 1 and day 28. Between the data collection period, participants completed a daily, 7-minute HIIT workout. A series of paired sample *t*-tests were computed to compare the pre- and post-HIIT raw values.

Significant improvements were found in all comparisons post-HIIT ($p < .001$). Therefore, it was concluded that 7-minutes of HIIT can assist PTs in reducing stress and burnout levels. Employers should consider implementing a workplace wellness program to benefit their employees.

Research Article

Open Access &

Peer-Reviewed Article

DOI: 10.14302/issn.2690-0904.ijoe-24-5353

Running Title:

7-Minute HIIT Workout On Stress And Burnout

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Keywords:

Stress, Burnout, Physical Therapy, Mental Health, Workout, High Intensity Interval Training, Outpatient, Occupational Health

Received: November 15, 2024

Accepted: December 09, 2024

Published: December 21, 2024

Citation:

Charles Salvo, Kristin Kissling, Andre Bearzi, Victoria Bondarenko, Tate Llanso et al. (2024) The Effects of A 7-Minute HIIT Workout on Stress and Burnout in Outpatient Physical Therapists. International Journal of Occupational and Environmental Medicine - 1(3):32-42. https://doi.org/10.14302/issn.2690-0904.ijoe-24-5353

Introduction

Stress in the workplace leads to poorer work outcomes.[1] Additionally, physical and mental health conditions are associated with high levels of stress. Stress can cause a weakening of the immune system and deconditioning due to low levels of physical activity.[2] Emotional stress in the workplace can also lead to burnout.[3] Burnout is defined as a mental and physical symptom of chronic stress in the workplace and it can include depersonalization, emotional exhaustion, and low feelings of accomplishment.[3-5]

It is important to understand the differences between burnout and stress in the literature. According to Pines and Kienan workplace burnout is related to a reduction in sense of significance at work, as well a reduction of meaning and importance of an individuals' work. While stress can have a significant impact on this, not all work stressors are considered negative and leading to burnout. High negative stress levels are associated with occupational strain.[6] Over a quarter of physical therapists report high emotional exhaustion, 15% report high stress, and 13% report experiencing burnout throughout their careers'.[7] Burnout may also

cause a lack of empathy among physical therapists which can lead to worse patient outcomes secondary to a decreased connection with their patients.[4] Therefore, reducing burnout in physical therapists is crucial to improving patient outcomes.

Wolff, et al. found a correlation between physical activity and mental health factors, which could help to improve burnout.[9] Regular physical activity has been found to reduce stress levels, anxiety, and depression in the general population.[2] Exercise has been shown to reduce adrenaline and cortisol and improve endorphin levels, which lowers an individual's stress level.[10] More recent studies looking at the physiology of exercise link the Sirtuin 1 (SIRT1) enzyme, which has been shown to be regulated by physical activity, to reducing physiological stress and improving antioxidant capacity and decreasing cardiovascular dysfunction.[11] Specifically, physical therapists who engage in regular exercise are shown to have improved mental health and well-being, while those who perform less activity report higher stress levels.[12] Even exercise that falls below recommended levels has been shown to improve physical and mental health in healthcare workers.[13] Healthcare workers who engage in regular physical activity experience positive mental health outcomes such as reduced stress and anxiety.[13]

Despite the benefits of exercise, it is difficult to allocate the time to improving fitness.[14] One solution for time efficiency is utilizing high-intensity interval training (HIIT) workouts.[15] HIIT has been shown to improve aerobic capacity, body composition, strength and power in lower limbs, and functional independence in the general population.[16] HIIT training also improved mental health in individuals, including reduced depressive symptoms and stress levels.[17] Exercise bouts as short as six minutes have been shown to improve energy, motivation, and mental fatigue in the older adult population.[18] The speed of the physical activity performed was crucial in showing mental health improvements indicating that short bouts of HIIT may be beneficial in improving mood in individuals.[18]

Utilizing a 7-minute HIIT training program to reduce stress and burnout levels in physical therapy has not yet been directly researched. However, based on the present literature on exercise, HIIT training, and their relationship to mental health, performing a 7-minute HIIT training program is likely to improve stress and burnout levels among full-time physical therapists. The purpose of this study was to examine the effects of a 28-day, 7-minute, HIIT workout on outpatient PT's stress and burnout levels. The null hypothesis stated that a 7-minute HIIT workout does not improve PT's stress and burnout levels.

Experimental Procedure

In this quasi-experimental pretest-posttest study the Perceived Stress Scale (PSS) (Appendix A), Maslach Burnout Inventory (MBI) (Appendix B), and a demographic survey (Appendix C) were administered following XXXX College IRB approval (#2024-02) and obtained written informed consent (Appendix D). Participants were asked to self-report their perceived stress using the PSS questionnaire to determine their PSS score.[19-20] The MBI was used as a tool to self-assess whether the participant might be at risk of burnout by exploring the three components: exhaustion, depersonalization and personal achievement.[21] Grip strength via handheld dynamometer for both dominant and nondominant, Functional Reach Test (FRT), and VO_{2max} values by the Queens College Step Test were also obtained for supplemental analysis. These assessments accurately examine an individual's strength, balance, and cardiovascular health.[22-24]

Participants were recruited by flyer advertisement. Participants were included if they worked in the outpatient physical therapy setting, were between the ages of 21-79 years old, and had mobile internet

access. Participants were excluded if they were a physical therapist outside of the indicated age ranges, did not work in outpatient PT setting, or did not have mobile internet access. The researchers coded all participant data with a numerical identifier so that participant names were not linked to data. No control group was included in this study. Efforts to reduce bias included obtaining participants from various outpatient physical therapy clinics and from multiple geographical regions. The study size was determined based off of time and availability of participants to allow for attainments of the study goals.

Participants downloaded the mobile app *Seven: 7 Minute Workout* to complete a universal, zero equipment, body weight, 7-minute HIIT workout as the daily intervention.[25] The training consisted of aerobic, upper and lower extremity strengthening, and balance exercises for 30 second bouts followed by 10 seconds of rest to switch exercises. The exercises were jumping jacks, push-ups, crunches, squats, plank, high knees running in place, lunges, push-ups with rotation, side plank, hip raises, triceps lifts, and steam engines.

Participants then initiated their daily 7-minute workout and begin the experimental trial. All the participants completed the 7-minute workout 7x/week for 4 weeks. The workout was completed in any location that is convenient for the participants. At the completion of the 4 weeks, the participants provided data about completion of the exercises and adherence to the program. The researchers then readministered the same measures to each participant under same parameters noted above.

Methods

Data were collected and imported on day 1 and day 28 into IBM SPSS version 28 for analysis. A series of paired sample *t*-test were conducted to compare the pre- and post-HIIT raw values of participants' PSS, MBI, grip strength scores, FRT, and VO_{2max} scores. The independent variables (IVs) were the 7-minute HIIT workout and obtained demographic information, while the dependent variables (DVs) will be the perceived stress scores on the PSS assessment, burnout scores on the MBI, grip strength scores, VO_{2max} (ml/kg/min), and Function Reach Test (FRT) scores. The null hypothesis was tested based on the statistical significance criteria of a pre-established (a priori) probability alpha (α) level of $\alpha = .05$.

STROBE checklist guidelines for and observational study was completed for this study and a copy was included as Supplementary Digital Content (SDC).

The sample for this study included 31 practicing Physical Therapists between ages of 25 and 50 (M = 33.03, sd = 6.93) with an average tenure of 8.58 years employed as a therapist (sd = 7.33). Most of the participants were male (64.5%) and employed full-time (93.5%). All but one reported their race as Caucasian / white, so results from this study may not be representative of a more diverse population. Additional demographics were captured and are reported in Table 1.

Results

Participants were evaluated for stress using the PSS questionnaire and for burnout using the MBI questionnaire both pre and post study. PSS scores ranging from 0-13 were considered low perceived stress, score ranging from 14-26 are considered moderate perceived stress, and scores 27-40 are considered high perceived stress. Scores were calculated for each component of the MBI and used to determine whether the participant was indicating low-level, moderate, or high-level burnout for each category. No participant identified as being a high-level burnout in all three categories which is indicative of being at risk of burnout either pre- or post-study. Preliminary analysis was done for

Table 1. Demographic descriptive statistics of study sample (N=31)

Description		*N*	Tools Used (%)	*Mean*	*Std. Dev.*
Currently getting treatment for stress					
	No	26	83.9%		
	Yes	5	16.1%		
Years practicing PT				8.58	7.33
	Up to 5 years	14	45.2%		
	6 to 10 years	8	25.8%		
	11 to 15 years	5	16.1%		
	16 to 20 years	0	0.0%		
	21 to 25 years	3	9.7%		
	Greater than 25 Years	1	3.2%		
Age (Years)				33.03	6.93
	25 – 30 years	16	51.6%		
	31 – 35 years	6	19.4%		
	36 – 40 years	5	16.1%		
	41 – 45 years	1	3.2%		
	46 - 50 years	3	9.7%		
Gender/Gender Identity					
	Male	20	64.5%		
	Female	11	35.5%		
Race					
	Hispanic or Latine	1	3.2%		
	White or Caucasain	30	96.8%		
Salary Range					
	$50,000 to $100,000	12	38.7%		
	$101,000 to $200,000	14	45.2%		
	Greater than $200,000	5	16.1%		
Relationship Status					
	Single / Never Married	4	12.9%		
	Dating	8	25.8%		
	Engaged	1	3.2%		
	Married or Domestic Partnership	18	58.1%		
Reported Number of Dependents				0.61	1.09
	No Dependents	22	71.0%		
	1	2	6.5%		
	2	5	16.1%		

	3	1	3.2%		
	4	1	3.2%		
Reported Days of Exercise per Week				3.55	1.52
	No exercise reported	2	6.5%		
	1 day per week	0	0.0%		
	2 days per week	6	19.4%		
	3 days per week	6	19.4%		
	4 days per week	6	19.4%		
	5 days per week	10	32.3%		
	6 days per week	1	3.2%		
	7 days per week	0	0.0%		
Employment Status					
	Part-time	2	6.5%		
	Full-time	29	93.5%		
Number of PT Positions Held				1.55	0.81
	1 Position	19	61.3%		
	2 Positions	8	25.8%		
	3 Positions	3	9.7%		
	4 Positions	1	3.2%		
Number of ALL Positions Held				1.97	1.20
	1 Position	11	35.5%		
	2 Positions	15	48.4%		
	3 Positions	3	9.7%		
	4 Positions	1	3.2%		
	5 Positions	0	0.0%		
	6 Positions	0	0.0%		
	More than 6 Positions	1	3.2%		

Table 2. PSS Score and MBI Score Classification Comparison Pre- to Post- HIIT (N=31)

Description		Pre-HIIT *N (%)*	Post-HIIT *N (%)*	CHI-SQ
Perceived Stress Scale Score				**8.010***
	Low	9 (29.0)	19 (61.3)	
	Moderate	22 (71.0)	12 (38.7)	
	High	0 (0.0)	0 (0.0)	
MBI Score (Exhaustion)				1.431
	Low	18 (58.1)	30 (96.8)	

	Moderate	13 (41.9)	1 (3.2)	
	High	0 (0.0)	0 (0.0)	
MBI Score (Depersonalization)				**18.483****
	Low	5 (16.1)	9 (29.0)	
	Moderate	13 (41.9)	15 (48.4)	
	High	13 (41.9)	7 (22.6)	
MBI Score (Personal Achievement)				**13.670***
	Low	11 (35.5)	18 (58.1)	
	Moderate	8 (25.8)	9 (29.0)	
	High	12 (38.7)	4 (12.9)	

*p < 0.01
** p < 0.001

Table 3. PSS, MBI, Dominant Hand Grip Strength, Non-dominant Hand Grip Strength, Functional Reach, and VO2 Max Raw Value Comparison Pre- to Post- HIIT (N=31)

Description	Pre-HIIT *M (sd)*	Post-HIIT *M (sd)*	t-value
PSS Score	16.29 (5.48)	12.13 (5.53)	**5.697****
MBI Scores			
Exhaustion	14.77 (6.55)	9.48 (4.50)	**6.519****
Depersonalization	11.74 (6.28)	8.00 (5.03)	**4.218****
Personal Achievement	34.90 (8.25)	40.19 (5.83)	**-4.807****
Dominant Hand Grip Strength	49.16 (17.97)	53.65 (17.34)	**-3.459***
Non-dominant Hand Grip Strength	48.41 (16.65)	51.74 (16.78)	**-2.479***
Functional Reach	14.73 (1.70)	16.13 (2.20)	**-4.271****
VO2 Max	49.39 (10.30)	54.65 (11.42)	**-4.044****

* p < 0.02
** p < 0.001

assumption testing prior to any group comparison. No missing values were found. In a few cases of Chi -square proportion comparison, some groups had less the five cases as indicated in Table 2.

A series of paired sample *t*-tests were conducted to compare the pre- and post-HIIT raw values of participants' PSS score and MBI scores. Preliminary analysis was done for assumption testing prior to any group comparison. No missing values were found. Normality was found in most groups via Shapiro-Wilk tests, with a few violations ignored due to the robustness of the *t*-tests uses. Significant differences were found in all comparisons with improvement seen for all scores post-HIIT as shown in Table 3.

A series of independent sample *t*-tests were conducted to compare the pre- and post-HIIT raw values of

Table 4. PSS and MBI Raw Value Comparison of participants being treated for stress, pre- and post-HIIT (N=31)

Description	Treatment for Stress (N = 5) Reported *M (sd)*	No Treatment for Stress (N = 26) Reported *M (sd)*	t-value
Pre-HIIT			
PSS Score	17.00 (5.05)	16.15 (5.65)	0.311
MBI Scores			
Exhaustion	13.40 (5.41)	15.04 (6.80)	-0.506
Depersonalization	10.00 (5.96)	12.08 (6.40)	-0.671
Personal Achievement	36.00 (10.32)	34.69 (8.02)	0.320
Pre-HIIT			
PSS Score	13.20 (6.50)	11.92 (5.45)	0.467
MBI Scores			
Exhaustion	7.80 (2.78)	9.81 (4.73)	-0.911
Depersonalization	5.80 (2.95)	8.42 (5.27)	-1.071
Personal Achievement	42.00 (6.44)	39.85 (5.77)	0.751

participants' PSS score and MBI scores between individuals that reported being treated for stress and those not being treated for stress. Preliminary analysis was done for assumption testing prior to any group comparison. No missing values were found. Normality was found in most groups via Shapiro-Wilk tests, with a few violations ignored due to the robustness of the *t*-tests uses. Levene's test for equality indicated equal variances ($p > 0.05$) between compared groups in all instances. No differences were found in any of the cases as shown in Table 4.

Discussion

This study aimed to find a solution to prevent burnout syndrome and reduce negative stressors in physical therapists through a 7-minute HIIT workout for 4 weeks. From the primary analysis, physical therapists who completed the 7-minute HIIT workout demonstrated significant improvements in the PSS and MBI. Only 7 minutes of daily exercise produced significant improvements in not only mental health, but also balance, strength, and cardiovascular stamina. Incorporating a 7-minute HIIT exercise program will likely lead to improved job satisfaction and productivity. Rodríguez-García, et al., found that physical therapists experiencing burnout demonstrate less empathy which may lead to worse patient outcomes due to a decreased connection with their patients.[15] Physical therapists also may be able to provide higher quality care to their patients since they are less likely to experience emotional exhaustion.[26] 7 minutes of exercise is also beneficial for those therapists who work full-time jobs and have a family, as it decreases the time constraint needed to produce significant improvements in one's stress and burnout levels which can lead to a more positive work place environment, improved patient outcomes, and benefit the reputation of the business. Employers can use this data to incorporate a workplace wellness program to reduce employee healthcare costs, increase productivity, decrease work loss time, and provide a positive return on investment.

Caparrós-Manosalva, et al., and Rodríguez-García, et al., also found that HIIT improves aerobic capacity, body composition, strength in lower limbs, power in lower limbs, and functional independence in the general population. Juan and colleagues noted that a single bout of HIIT can increase SIRT1 muscular gene expression while chronic exercise increases overall blood levels of SIRT1.[11] These studies concur with these findings and reinforce that utilizing a 7-minute HIIT workout has the benefits of improving grip strength (dominant and non-dominant hands), balance, and VO2 max. Performing a short exercise bout can produce significant improvements in physical performance measures, similar to a traditional exercise program. Therefore, a 7-minute HIIT workout does not need to be done in addition to one's current exercise program and may still produce benefits similar to a traditional program. This form of workout may be beneficial for individuals with time constraints and may be having trouble finding time to perform any physical activity outside of work.

There were identified limitations to this study. This study utilized convenience sampling which may not reflect the proper results of the entire population of physical therapists. There are often larger than regional differences in stress levels which may not have been accounted for. In collecting our measurements there were some slight inconsistencies with the testing surfaces for the 3 Minute Step Test. In some instances, a high-low table was used and set to the proper height and in other instances, steps that could be stacked on top of each other were used to conduct the test. This subtle change in the surface may have an impact on results. In addition, all participants were aware of the goals of the study prior to participating, which may have skewed their self-reported stress scores into being higher than they truly were post-intervention. Other confounding variables may include other exercises programs subjects may have been participating in, additional outside life stressors not related to the clinic, sickness, and the pre- and post-tests being completed before and after daylight savings which may have altered mood.

While previous studies examined the effects of exercise on mental health, stress, and burnout, this study is believed to be the first to explore the effects of high intensity interval training on stress and burnout in physical therapists. Despite this study yielding significant results in all measured outcomes, the sample size of 31 participants limits the generalizability of the results. Additionally, all participants were exposed to the independent variable (HIIT workout), raising the question as to whether improvements can be attributed specifically to high intensity interval training rather than general exercise. It is recommended that future studies including larger sample sizes as well as a control variable be completed to either support or refute the findings of this study that high intensity interval training can decrease stress and burnout in physical therapists. Furthermore, to increase the accuracy and validity of our data some future suggestions include being able to monitor daily workouts our subjects completed on the app *Seven*, utilizing cardiovascular measurements to make sure participants were working at high enough intensities during their HIIT workouts each day, and standardizing the risers used for the 3-minute step test.

Conclusion

Based on the current findings of this study, it can be concluded that in as little of a time commitment of 7 minutes daily, Physical therapists can benefit from a high intensity interval training workout to reduce stress and career burnout, improve VO2 max, increase their functional reach ability, and improve grip strength. Employers can utilize these findings in implementing a workplace wellness program to reduce employee healthcare costs, increase productivity, and decrease work loss time.

Acknowledgements

Funding Sources for All Authors

NONE DECLARED

Conflict of Interest for All Authors

NONE DECLARED

Address of Reprints

Same as corresponding author

All Sources of Support Relevant to Publication

NONE DECLARED

Specific Author Contributions

Charles Salvo: IRB application, study design, study methods, data collection, data analysis, results, conclusion, clinical relevance

Kristin Kissling: Data collection, manuscript edit and submission

Andre Bearzi: Data collection

Victoria Bondarenko: Data collection

Tate Llanso: Data collection

Luke Tolley: Data collection

Matthew Weinstock-Collins: Data collection

Matthew Caputo: Data analysis, results

Data availability

Stored in password protected server. Available upon request.

EQUATER Network checklist utilized: Adhered to the STROBE Guidelines

Ethical considerations

Lebanon Valley College IRB Approval # 2024-02. Informed consent obtained

AI was not utilized in any stages of the hypothesis, data collection, data evaluation, or manuscript preparation.

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