

Exercise as an Adjuvant to Post Acute Withdrawal Syndrome Management in Substance Use Disorder

Raj Masih, Barbra Masih, Kaylin Arbaugh, Michael Philbrick, Hunter Pool,
Himan Bhatia, Kshiraj Panchal, Alex Mongold, Christian Landis

¹MD MPH, FRSPH, West Virginia Office of Drug Control Policy, West Virginia, United States

²MS, LPC, CRC, NCC Prevention Specialist, Department of Substance Use Prevention, Potomac Highlands
Mental Health Guild, West Virginia, United States

³BS, Coordinator BUMPS Program, Department of Substance Use Counseling, , Potomac Highlands Mental
Health Guild, West Virginia, United States

⁴BS, Research Assistant, Department of Substance Use Prevention, Potomac Highlands Mental Health Guild,
West Virginia, United States

⁵BS, Research Assistant, Department of Substance Use Prevention, Potomac Highlands Mental Health Guild,
West Virginia, United States

⁶MS Engineering, Data Scientist, Noah Medical Wellness Center, West Virginia, United States

⁷BS, Research Assistant, Noah Medical Wellness Center, West Virginia, United States

⁸BS, Information Technology Assistant, Potomac Highlands Guild, West Virginia, United States

⁹BS, Research Assistant, Department of Substance Use Prevention, Potomac Highlands Mental Health Guild,
West Virginia, United States

Abstract:

The role of exercise as a treatment option for substance use disorders (SUD) has been described previously. Several studies have shown the effectiveness of exercise as a treatment for alcohol dependence, smoking, and other substance use disorders. Exercise has been shown to help decrease substance use and increase abstinence. High relapse rates and lack of successful outcomes for stimulant use disorders have warranted the need for new treatment options. Post-Acute Withdrawal Syndrome is the second stage of withdrawal and happens after the acute withdrawal symptoms subside when there are fluctuations in the brain chemicals. Some of the symptoms include irritability, difficulty concentrating, low energy, and difficulty managing stress. Many of these symptoms can be a factor causing an individual to relapse and decrease the likelihood of seeking treatment again. For the purpose of our study, we wanted to examine the relationship between exercise and the Post-Acute Withdrawal Syndrome symptoms in those with a stimulant use disorder. We enlisted 26 clients with a SUD involving methamphetamine and enrolled half of them in a traditional addiction treatment plan and the other half in an exercise treatment regimen including resistance training and aerobic training along with the traditional recovery plan for six weeks. Survey questions to assess their post-acute withdrawal symptoms were asked at weeks one and six. Our study found a much larger reduction in Post-Acute Withdrawal Syndrome symptoms for the participants enrolled in the exercise arm of the study. Thus, a structured exercise program can be a useful adjunct to the treatment regimen of those struggling with a stimulant use disorder. Exercise can be helpful in reducing symptoms of Post-Acute Withdrawal Syndrome, which will likely decrease the likelihood of relapse.

Key Words: exercise, post-acute withdrawal, adjuvant

Date of Submission: 03-07-2022

Date of Acceptance: 17-07-2022

I. Background:

Post-Acute Withdrawal Syndrome is the second stage of withdrawal, happening after the acute withdrawal symptoms have subsided. During this time, the brain is trying to reach equilibrium and there are many fluctuations in the brain's chemicals. Some examples of symptoms commonly seen are trouble thinking and concentrating, mood swings, depression, anxiety and panic, memory issues, sleep disturbances, physical coordination problems, low energy, difficulty managing stress, irritability, and repetitive thinking, elevated heart rate, and unexplainable chronic pain. The symptoms can often cause the individual to relapse and may also decrease the likelihood of the individual to seek treatment for substance use again.

The role of exercise to prevent SUD, and as a component of conventional treatment for SUD has been described before by others (Abrantes et al., 2011; Linke & Ussher, 2014; Smith & Lynch, 2012). Compared to alcohol and opioid use disorders, which have treatment medications, the treatment options for stimulant use disorders are very limited. One of the best current treatment options for stimulant abuse is combining cognitive behavioral therapy with contingency management. Still, the lack of successful outcomes and low percentage of participants achieving abstinence suggest a need for new treatment options (rationale for using exercise). Several studies have been conducted on the effectiveness of exercise on treatment of alcohol dependence, smoking, and even other substance use disorders (Greer et al., 2012; Wang et al., 2014). These studies have shown that exercise can help decrease substance use, increase abstinence, as well as extending abstinence periods in the context of alcohol, marijuana, and other substances. Also, exercise has been effective in improving outcomes in smoking cessation treatment and alcohol and other substance abuse treatment. Using exercise as a treatment regimen has been shown to help reduce cravings, and support and decrease withdrawal symptoms (Greer et al., 2012; Wang et al., 2014). Exercise has also been shown to help with symptoms of depression, improving mood and quality of life, which commonly plays a role in substance use disorders. Lastly, the use of stimulants is very harmful to the physical health of the user, affecting sleep and cognitive function. It is also common for people who have stopped using to gain weight which puts them at risk for relapse. Thus, the positive effects that exercise can have on a person's health, such as improving sleep and helping lose weight, can also help improve the outcomes stimulant users will have.

Objective: Our study purpose was to explore the relationship between exercise and Post-Acute Withdrawal Syndrome symptomatology in those with a stimulant SUD. Our hypothesis was that exercise would improve symptoms of post-acute withdrawal syndrome (PAWS) more than treatment as usual (counseling and peer-recovery support services).

II. Methods:

After obtaining authorization from the Institutional Review Board (IRB) for Human Experimentation, 26 clients with documented history of SUD involving methamphetamine or both heroin and methamphetamine were enrolled in the study at a regional licensed behavioral healthcare facility outpatient treatment program. 17 male and 9 female clients ranging in age from 17-41 were enrolled (**See Figure 1**). 13 were enrolled in traditional treatment plans (Counseling, recovery coaching, and 12 Step meetings), and 13 were enrolled in the exercise arm of the study which included structured resistance training, aerobic exercise along with the above traditional treatment plan modalities (**See Figure 2**). Study duration was 6 weeks. None of the clients received Medication Assisted Treatment (MAT).

All enrolled clients completed a consent form and the risks and benefits of the study were communicated to each participant. Each participant in the exercise arm of the study was required to complete a PAR-Q questionnaire and receive medical clearance for exercise from their healthcare provider.

Inclusion Criteria:

- Documented history of early recovery from Psychostimulant Use Disorder and or Opioid Use Disorder
- Ability to attend all treatment appointments
- Ability to exercise at home or in the gym with instruction by an exercise physiologist and personal trainer on the targeted exercise regimen (**See Figure 1**)

Exclusion Criteria:

- Severe cardiopulmonary disease
- Disabling osteoarthritis or other extremity disease that limited mobility and ability to participate in exercise

Figure 1:

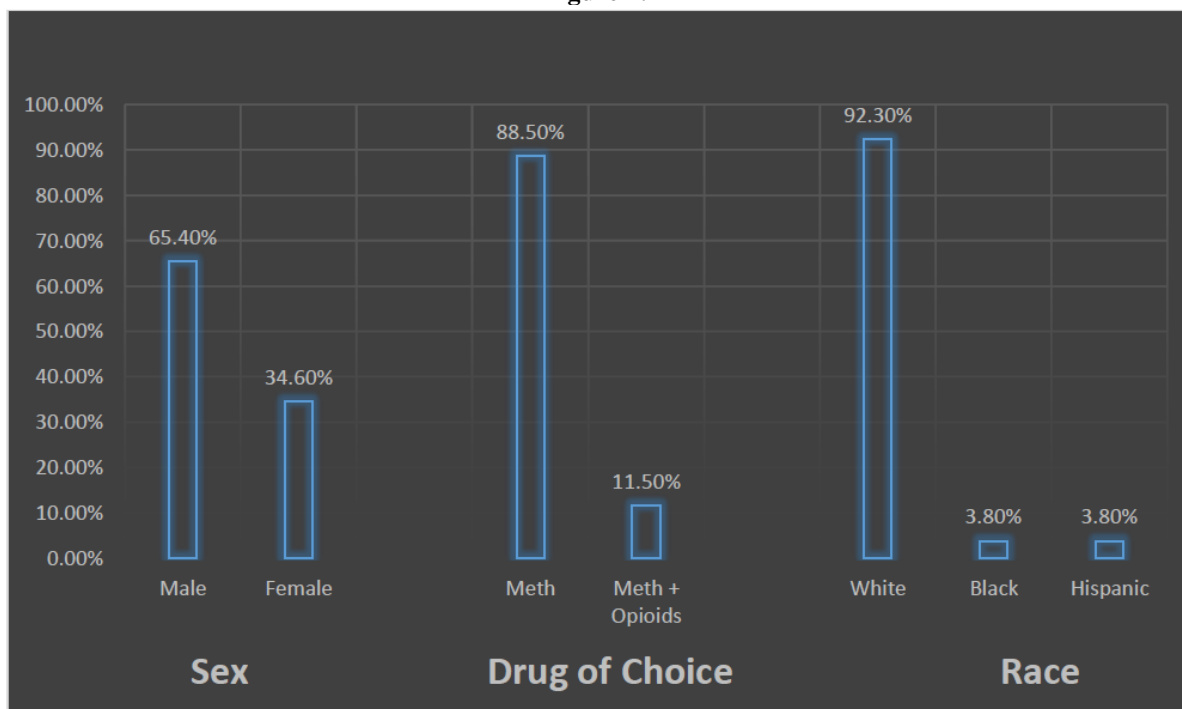


Figure 2:

5 Day Beginner Workout Routine	
Duration	6 Weeks
Goal:	To build additional strength levels and allow for maximum muscle rest and recovery periods for deeper levels of muscle development.
Method:	<ul style="list-style-type: none"> • 5 workouts with one main muscle group trained at each session. • Cardio to be performed at the end of each workout and once on a non-workout day. • Push/pull principle will allow muscles additional rest and recovery. Mid to high repetition ranges to ensure full muscle stimulation. • Uses a spill over technique to ensure that each muscle group is worked. • 3 sets for each exercise including one warm up.

Survey Questions asked at Week 1 and Week 6:

- On a scale of 0-10 how bad are you experiencing restless legs (0= no restless leg symptoms, 10 = severe constant restless leg symptoms)
- On a scale of 0-10 how bad is your sleep either can't sleep or too sleepy (0 = no sleep disturbance, 10 = severe daily sleep disturbance)
- On a scale of 0-10 how is your energy level (0= normal energy level, 10 = almost no energy)
- On a scale of 0-10 how is your concentration (0 = no problems concentrating, 10 = severe difficulty concentrating)
- On a scale of 0-10 how is your mood (0 = normal mood, 10 = bad mood almost all the time)

- On a scale of 0-10 how is your ability to engage in counseling (0 = no problems engaging in counseling, 10 = inability to engage in counseling due to symptoms)

The study specifically measured symptoms of Post-Acute Withdrawal at weeks 1-6 utilizing the Addiction Severity Index (ASI). The researchers utilized the indices by self-report surveys conducted at enrollment and at the end of weeks 1-6. No relapses occurred in either arm.

III. Results:

Week 1 and week 6 survey results for both the conventional arm and the targeted exercise arm of the study participants were evaluated using Analysis of variance (ANOVA) for both intra-group and inter-group for the differences among means. (See Figure 3)

Figure 3:

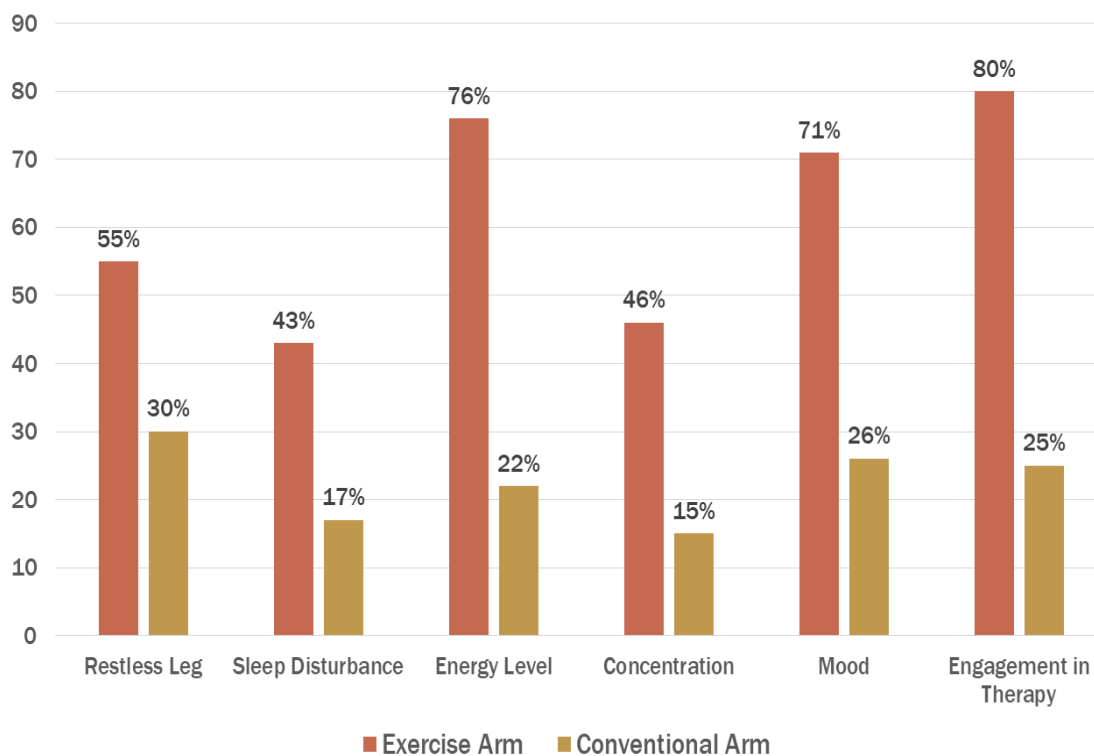
Post-Acute Withdrawal Symptoms																	
Scale 0-10																	
Age	Sex	Drug of Choice	Race	Study Arm	Convention Arm	Restless Leg		Sleep Disturbance		Energy Level		Concentration		Mood		Engagement in Therapy	
						Week 1	Week 6	Week 1	Week 6	Week 1	Week 6	Week 1	Week 6	Week 1	Week 6	Week 1	Week 6
39	F	Meth	W		X	8	2	8	4	10	5	10	1	10	5	9	3
33	M	Meth + Opioids	W		X	5	2	7	3	9	1	7	2	8	1	5	0
27	M	Meth	W		X	6	1	9	3	9	5	7	2	8	3	3	1
21	F	Meth	Black	X		4	1	10	5	5	3	6	1	6	2	4	2
17	M	Meth	W	X		3	1	9	2	7	3	10	2	6	0	4	1
41	F	Meth	W	X		3	0	7	0	7	4	9	3	5	0	2	0
40	F	Meth	W		X	2	0	5	1	7	3	8	2	3	0	0	0
31	M	Meth	W			9	3	9	3	10	5	10	3	10	5	10	5
26	M	Meth	W	X		8	2	9	2	10	4	7	1	7	3	8	5
25	M	Meth + Opioids	W	X		7	2	7	3	10	5	7	1	7	2	5	4
31	F	Meth	W	X		6	1	8	2	10	6	6	2	7	5	8	1
22	M	Meth	W		X	6	2	8	1	9	3	7	2	5	0	7	1
27	M	Meth	W	X		8	1	9	3	9	2	10	5	6	1	10	5
37	M	Meth	W		X	7	3	10	8	9	5	10	4	8	2	7	3
38	M	Meth	W		X	6	1	9	5	9	5	8	3	6	1	2	2
30	M	Meth	Hispanic	X		5	1	7	3	8	4	9	2	4	0	3	0
20	M	Meth + Opioids	W	X		7	2	8	2	10	4	9	3	7	1	8	2
26	M	Meth	W		X	3	0	5	0	7	3	9	2	4	0	3	0
24	M	Meth	W	X		8	1	7	2	10	5	8	1	10	3		1
40	F	Meth	W	X		2	0	5	3	7	2	0	0	5	2	0	0
39	F	Meth	W		X	5	2	7	2	10	5	1	0	5	0	4	0
38	F	Meth	W		X	7	1	7	3	9	4	10	3	10	3	8	1
31	F	Meth	W	X		6	1	8	2	9	3	10	4	9	3	7	3
23	M	Meth	W	X		7	1	8	3	9	3	9	3	8	4	5	2
39	M	Meth	W		X	8	3	10	3	9	3	8	3	6	2	6	3
40	M	Meth	W		X	3	0	6	2	5	1	5	0	5	1	6	2

IV. Discussion:

Our study demonstrated a dramatic improvement in symptoms of Post-Acute Withdrawal Syndrome in the participants in the exercise arm of the study compared to the conventional arm. The outcomes of the symptom reduction are illustrated in Figure 4. There was a higher percentage of symptom reduction in the exercise arm than the conventional arm. Restless leg syndrome was 55% for the exercise arm and 30% for the conventional arm with a difference of 25%. Sleep disturbances was 43% for the exercise arm and 17% for the conventional arm with a difference of 26%. Energy level was 76% for the exercise arm and 22% for the conventional arm with a difference of 54%. Concentration was 46% for the exercise arm and 15% for the conventional arm with a difference of 31%. Mood was 71% for the exercise arm and 26% for the conventional arm with a difference of 45%. Engagement in therapy was 80% for the exercise arm and 25% for the conventional arm with a difference of 55%. From this it is clear that participants who engaged in a targeted resistance training and aerobic exercise program in conjunction with conventional treatment improved quicker and had a more profound reduction in PAWS symptoms across all measured indices.

Figure 4:

Week 6 Symptom Reduction



V. Conclusion:

Post-Acute Withdrawal syndrome is well described in early recovery from SUD and has been shown to be a significant factor in relapse. The role of dopamine depletion has been well described as the neurophysiologic correlate of Post-Acute Withdrawal Syndrome. The use of a structured exercise program including resistance training coupled with aerobic exercise can be a useful adjuvant to potentiate early recovery, reduce symptoms of Post-Acute Withdrawal Syndrome and to mitigate early relapse.

Our study found a much larger reduction in Post-Acute Withdrawal Syndrome symptoms for the participants enrolled in the exercise arm of the study. Thus, a structured exercise program can be a useful adjunct to the treatment regimen of those struggling with a stimulant use disorder. Exercise can be a helpful adjunct in reducing symptoms of Post-Acute Withdrawal Syndrome, which may decrease the likelihood of relapse. Based on our study findings, it is our recommendation that all residential and outpatient treatment programs for substance use disorders consider adding a targeted exercise program utilizing both resistance and aerobic training as a component of treatment, particularly for psychostimulant use disorder.

References:

- [1]. Abrantes, A. M., Battle, C. L., Strong, D. R., Ing, E., Dubreuil, M. E., Gordon, A., & Brown, R. A. (2011). EXERCISE PREFERENCES OF PATIENTS IN SUBSTANCE ABUSE TREATMENT. *Mental health and physical activity*, 4(2), 79–87. doi:10.1016/j.mhpa.2011.08.002
- [2]. Greer TL, Ring KM, Warden D, Grannemann BD, Church TS, Somoza E, Blair SN, Szapocznik J, Stoutenberg M, Rethorst C, Walker R, Morris DW, Kosinski AS, Kyle T, Marcus B, Crowell B, Oden N, Nunes E, Trivedi MH. Rationale for Using Exercise in the Treatment of Stimulant Use Disorders. *J Glob Drug Policy Pract.* 2012. Spring;6(1):http://ctndisseminationlibrary.org/display/825.htm. PMID:25364477; PMCID:PMC4214380
- [3]. Linke, S. E., & Ussher, M. (2014). Exercise-based treatments for substance use disorders: evidence, theory, and practicality. *The American journal of drug and alcohol abuse*, 41(1), 7–15. doi:10.3109/00952990.2014.976708
- [4]. Smith, M. A., & Lynch, W. J. (2012). Exercise as a potential treatment for drug abuse: evidence from preclinical studies. *Frontiers in psychiatry*, 2, 82. doi:10.3389/fpsy.2011.00082
- [5]. Wang D, Wang Y, Wang Y, Li R, Zhou C (2014) Impact of Physical Exercise on Substance Use Disorders: A Meta-Analysis. *PLoS ONE* 9(10): e110728. <https://doi.org/10.1371/journal.pone.0110728>

Raj Masih, et. al. "Exercise as an Adjuvant to Post Acute Withdrawal Syndrome Management in Substance Use Disorder." *IOSR Journal of Sports and Physical Education (IOSR-JSPE)* 9(4), (2022): pp. 05-09.