



Stimulant Reduction Intervention Using Dosed Exercise (STRIDE): Gender Differences

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Level of evidence for the therapeutic activity of exercise

Classification	Source of evidence	Disorder
1A	Meta-analysis of randomized controlled trials	Major depressive disorder Nicotine dependency
1B	Randomized controlled trials	Social phobia Panic disorder Post-traumatic stress disorder Generalised anxiety disorder Binge eating disorder Bulimia nervosa Schizophrenia Alzheimer's dementia Mild cognitive impairment
2	Non-randomized controlled trials (quasi experiments)	Alcohol and drug dependence Anorexia nervosa
3	Observational studies with controls	-
4	Observational studies without controls	Bipolar disorder Obsessive compulsive disorder

Potential Benefits of Exercise for Males and Females

- Improve sleep disturbance
- Improve cognitive function
- Improve mood
- Improve quality-of-life
- Improve anhedonia
- Weight reduction
- Reduce cravings



Gender Differences Related to Exercise

- Men more active than females
- Personal incentives to exercise
- Types of exercise preference
- Time spent exercising
- Intensity of exercise – low peak exercise capacity in women
- Cardiovascular, respiratory and metabolic responses to exercises

STRIDE: CTN National Study

- Two-group randomized control trial to test the effectiveness of the addition of exercise or health education to treatment-as-usual in improving drug treatment outcomes.
- Explore gender differences in exercise intervention attendance and barriers to attendance, adherence, and weight response.



STRIDE: CTN National Study

- Lead Expert Team - University of Texas Southwestern Medical Center , Dallas, Texas – PI - Madhukar Trivedi, MD
- Nine CTP Sites
 - Arapahoe House, Florida Node
 - Gibson Recovery Center, Ohio Valley
 - Gateway Community Services, Florida Node
 - Nexus Recovery Center, Texas Node
 - Ralph Johnson Veterans Memorial Hospital, Charleston, SC
 - Memorial Hermann, Texas Node
 - Morris Village, Columbia SC
 - Penn Presbyterian, Delaware Valley Node
 - St. Luke's Roosevelt Hospital, Greater NY Node

Inclusion Criteria

- Age 18-65
- Stimulant abuse or dependence
- Stimulant use within 30 days of admission
- Medical Clearance including maximal exercise test using ACSM guidelines
- Body Mass Index (BMI) ≤ 40 kg/m² or BMI > 40 kg/m² and cleared by medical personnel to exercise.

Exclusion Criteria

- Medical condition contraindicating exercise
- Current opioid dependence
- High suicide/psychiatric risk/psychiatric disorder
- Pregnancy
- Physically active (consistent activity > 20 minutes more than 3 times per week for 3 months prior to enrollment)
- Concomitant treatments: beta blockers, methadone, buprenorphine

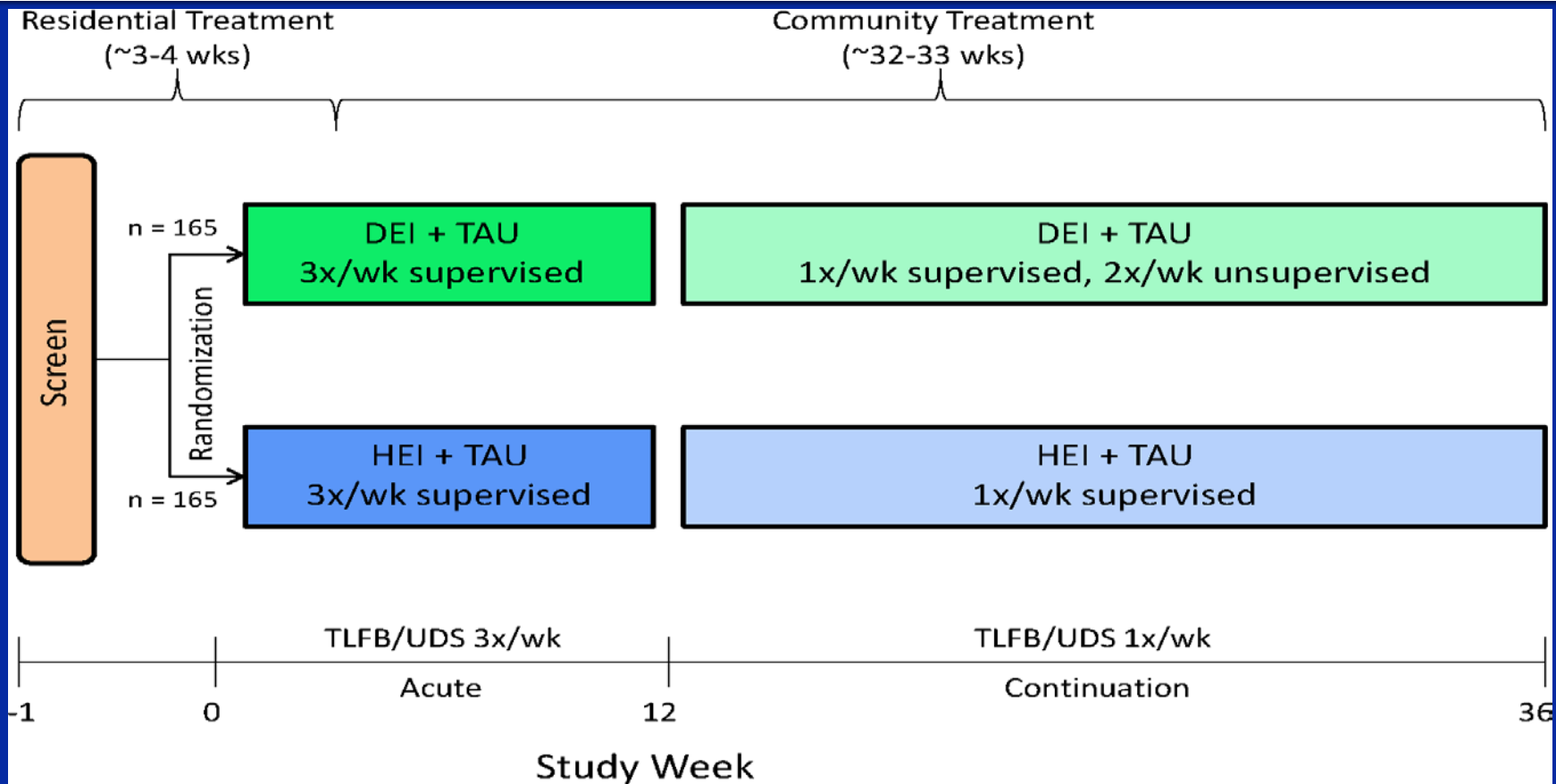


Design

- Interventions initiated in 21- to 30 day residential treatment and continued through outpatient and aftercare.
- Longer duration – 9 months
- Supervised sessions
- Behavioral adherence program
- Web - based monitoring

STRIDE Protocol Design

Trivedi et al. *Trials* 2011, 12:206



DEI = Dosed Exercise Intervention Augmentation
HEI = Health Education Intervention Augmentation
TAU = Treatment as Usual



STRIDE Assessments

- Substance abuse – TLFB, UDS, ASI Lite, SSSA, SCQ-Brief
- Mood
- Psychosocial and quality of life
- Cognitive function
- Physiologic indices – weight, BMI, waist circumference, BP, HR
- Initial Exercise Planning Worksheet to record barriers to exercise

Maximal Exercise Testing Procedure

- **Purpose:** To examine cardiorespiratory responses to maximal exercise testing.
 - Screening of participants to identify participants for whom exercise might be hazardous.
 - Establish a pre-study exercise prescription - based on the maximum HR achieved during the maximal exercise test.

Exercise Intervention

- Exercise dose: 12 kcal/kg/week (equivalent to 120-150 minutes of exercise a week or 30 minutes 4-5 times a week)
- Exercise intensity: 70 – 85% maximal heart rate
- Exercise modality: Running or walking (treadmills)
- To maximize tolerability and adherence, exercise was gradually titrated up to the required dose and intensity over the course of 3 weeks.

Health Education Intervention

- Educational readings, discussions and videos
 - E.g., healthy eating, preventative health care, accessing health resources
- Participants helped select topics
- Pedometers used to verify typical activity levels in both groups

Visit Schedule

- For supervised Exercise and Health Education visits
 - 12 weeks: 3 times per week
 - First 21 to 30 days in Residential Treatment Program (RTP)
 - Post RTP into outpatient follow – up care
 - 12 weeks to 6 months: once weekly

Intervention Acceptability by Gender

- Percent (%) completed acute phase
- Average weekly session attendance post RTP
- Session adherence - kcal/kg week expended post RTP
- Barriers to attendance
- BMIs, weights

Demographic Characteristics by Gender

Baseline Variable	All N = 302 Mean (SD)	Male N = 181 Mean (SD)	Female N = 121 Mean (SD)	F Stat	p-val	Effect Size
Age Mean (SD)	38.97 (10.8)	41.17 (10.8)	35.67 (9.9)	20.0	0.000	0.06
Race/Ethnicity N (%)						
White/Not Hispanic	137 (45%)	75 (41%)	62 (51%)	2.8	0.094	0.1
Black/Not Hispanic	130 (43%)	94 (52%)	36 (30%)	14.6	0.000	-0.22
Hispanic/Latino	31 (10%)	10 (6%)	21 (17%)	11	0.001	0.19
Other/Not Hispanic	12 (4%)	3%	6 (5%)	0.5	0.474	0.04
Employed N (%)	95 (31%)	71 (39%)	24 (20%)	12.6	0.000	-0.20
Marital Status				2.6	0.27	0.09
Married	40 (13%)	23 (13%)	17 (14%)			
Wid/Sep/Div	101 (33%)	67 (37%)	34 (28%)			
Never Married	161 (53%)	91 (50%)	70 (57%)			

Substance Use Disorders by Gender

Variable	All N = 302	Male N = 181	Female N = 121	X ²	P-value	Effect size
Cocaine Dependence	253 (84%)	162 (90%)	91 (76%)	10.1	0.002	-0.18
Stimulant Categories				13.4	0.001	0.21
Cocaine Ab/Dep only	177 (59%)	119 (66%)	58 (48%)			
Cocaine and Stimulant Ab/Dep	92 (31%)	51 (28%)	41 (34%)			
Other Stimulant Ab/Dep only	32 (11%)	11 (6%)	21 (18%)			
Alcohol Dependence	152 (50%)	104 (57%)	48 (40%)	9.2	0.002	-0.17
Marijuana Dependence	96 (32%)	66 (36%)	30 (25%)	4.4	0.037	-0.12
		Mean (SD)	Mean (SD)	F stat	P-value	Effect size
Days Cocaine use Baseline N = 157 Males/ N = 82 Females		10.4 (8.8)	13.7 (8.8)	7.9	0.005	0.03
Days Meth use Baseline N = 38 Males/ N = 43 Females		10.7 (8.9)	16.7 (9.6)	8.4	0.005	0.08

Reasons for Screen Fail by Gender

N = 497 screened; males N = 303 Females N = 194	Screen Fails				
Baseline Variable	Total N = 195 (%)	Male N = 122 (%)	Female N = 73(%)	Chi-Sq	P-Val
No Stim Past 30 Days	47 (9.5)	33 (10.9)	14 (7.2)	1.9	0.172
Does not Meet DSM-IV-TR Stim Criteria	82 (16.5)	54 (17.8)	28 (14.4)	1.0	0.321
No Medical Clearance	170 (34.2)	105 (34.7)	65 (33.5)	0.1	0.792
BMI Exclusion	124 (24.9)	77 (25.4)	47 (24.2)	0.1	0.766
General Medical Condition	136 (27.4)	85 (28.1)	51 (26.3)	0.2	0.667
Opioid Dependence	67 (13.5)	42 (13.9)	25 (12.9)	0.1	0.756
Suicide Risk	55 (11.1)	40 (13.2)	15 (7.7)	3.6	0.058
Significant Physical Activity	16 (3.2)	13 (4.3)	3 (1.5)	2.9	0.091
Current Psychotic Disorder	62 (12.5)	41 (13.5)	21 (10.8)	0.8	0.373
Concomitant Medication Treatments	46 (9.3)	37 (12.2)	9 (4.6)	8.1	0.004
Participation Hazardous	64 (12.9)	48 (15.8)	16 (8.2)	6.1	0.014

Attendance and Adherence by Gender

Outcome (weekly averages)	All	Male	Female	t	df	p
Sessions attended post Residential Treatment	2.03 (1.0)	2.16 (1.0)	1.85 (1.0)	2.5	290	.011
Health Education Intervention		2.29 (1.0)	2.12 (1.0)	1.0	144	.298
Dosed Exercise Intervention		2.02 (1.0)	1.59 (1.0)	2.5	144	.015
Exercise adherence Kcal/Kg/Week expended		8.2 (3.7)	6.8 (3.7)	2.3	150	.022

Outcome	All	Male	Female	χ^2	df	p
Percent completed acute phase (BL – 12 weeks)	90%	92.2%	87.6%	1.8	1	.183

Predictors of Exercise in the Dosed Exercise Group

Outcome	Estimate	STD Error	T-Value	DF	P-Value
Intercept	5.81	2.21	2.6	1	0.0094
Gender	-1.14	0.70	-1.6	1	0.1041
# Current Disorders	-0.41	0.27	-1.5	1	0.1356
Days of Use Prior to RTP	0.02	0.04	0.5	1	0.6330
Age	0.08	0.03	2.5	1	0.0155
White vs Non-White	0.46	0.79	0.6	1	0.5640
Hispanic	2.16	1.06	2.0	1	0.0432
BMI	-0.04	0.06	-0.7	1	0.4781
PTSD	1.33	1.15	1.1	1	0.2529
Cocaine & Stim Dependence	-0.20	0.73	-0.3	1	0.7843

Barriers to Exercise by Gender (n=226)

Barriers	All N = 226 (%)	Male N = 126 (%)	Female N = 100 (%)	Chi-Sq	P-Val
Time	56 (24.8)	39 (31)	17 (17)	5.8	0.016
Travel	59 (26.1)	29 (23)	30 (30)	1.4	0.235
Work	43 (19)	33 (26.2)	10(10)	9.5	0.002
Fatigue	9 (4)	4 (3.2)	5 (5)	0.5	0.486
Motivation	21 (9.3)	12 (9.5)	9 (9)	0.0	0.893
Holiday	10 (4.4)	4 (3.2)	6 (6)	1.1	0.305
Weather	5 (2.2)	2 (1.6)	3 (3)	0.5	0.473
Inconvenience	18 (8)	7 (5.6)	11 (11)	2.3	0.133
Emotion	11 (4.9)	2 (1.6)	9 (9)	6.6	0.010
Social	2 (0.9)	1 (0.8)	1 (1)	0.0	0.869
Support	5 (2.2)	3 (2.4)	2(2)	0.0	0.847
Family	26 (11.5)	10 (7.9)	16 (16)	3.6	0.059
Stress	9 (4)	4 (3.2)	5 (5)	0.5	0.486
Injury	11 (4.9)	3 (2.4)	8 (8)	3.8	0.051
Pain	19 (8.4)	8 (6.3)	11 (11)	1.6	0.211
Health	21 (9.3)	10 (7.9)	11 (11)	0.6	0.431
No Barriers	125 (55.3)	81 (64.3)	44 (44)	9.3	0.002
Other Barriers	84 (37.2)	43 (34.1)	41 (41)	1.1	0.288
Transportation	12 (5.3)	2 (2.4)	0 (0)	4.0	0.038

Note: Percent who reported barrier at least once after KIR during the acute phase

Gender Differences in Weight and BMI after Acute Phase Treatment N = 302

Outcome	Gender	Baseline	End of Acute Phase	Exit-Baseline	t	df	p-value*
BMI	Male N = 181	27.28	27.45	0.19			
BMI	Female N = 121	28.70	29.28	0.57	1.96	299	0.050
Weight (KG)	Male N = 181	84.60	85.26	0.73			
Weight (KG)	Female N = 121	76.92	78.47	1.55	2.56	297	0.011

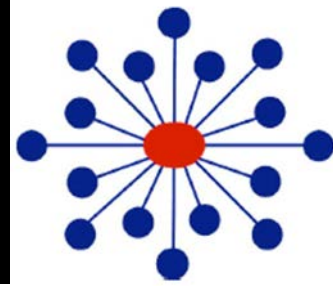
*Test of gender effect in exit-baseline difference controlling for baseline.

Conclusions



- No gender differences between % completion of acute phase post RTP in both interventions.
- Men attended more exercise sessions per week than women post RTP.
- No gender differences in HEI session attendance per week post RTP.
- Men were more adherent to the exercise prescription than women.
- Higher % of men compared to women reported no barriers to exercise with women reporting more transportation, emotional and injury barriers.

Clinical Implications



- Addressing barriers to attendance may improve retention in exercise treatment.
- Programs may want to offer different types of exercise options for males and females.
- Weight gain in women may be attributed to lower levels of exercise (adherence to prescribed dose) and/or increase in energy intake.
- Weight gain in women may be a trigger for relapse or intervention attrition.
- Adjunctive dietary counseling may improve weight gain in women.

Thank You