INTENTION TO IMPLEMENT DOSE EXERCISE AS A STIMULANT REDUCTION INTERVENTION: A SECONDARY ANALYSIS

by

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ABBREVIATIONS

AA	Alcoholics Anonymous
ACASG	Attitudes about Controversial Aspects of 12-Step Groups
ASNIS	Attitude Social Norm Intention Survey
CBT	Cognitive Behavioral Therapy
CSAT	Center for Substance Abuse Treatment
CTN	Clinical Trials Network
DEI	Dose Exercise Intervention
EBAS	Exercise Behavior and Attitude Survey
HEI	Health Education Intervention Augmentation
IOM	Institute of Medicine
MI	Motivational Interviewing
MSE	Mean Square Error
N-SSATS	National Survey on Substance Abuse Treatment Services
NA	Narcotics Anonymous
PTSD	Post-traumatic Stress Disorder
RA	Research Assistant
REBT	Rational Emotive Behavioral Therapy
SIGCS	STRIDE Integration Goal Commitment Scale
SITE	Site Influence on Treatment Effects
STRIDE	STimulant Reduction Intervention using Dosed Exercise
TPB	Theory of Planned Behavior

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ABSTRACT

More than 23 million people in the United States need of treatment for alcohol or illicit drug use. Significant proportions of individuals receiving treatment either relapse or drop out before treatment completion. While organizations such as The National Drug Abuse Treatment Clinical Trials Network have been working to bridge the gap between emerging treatment methods and practices, intention to implement such methods continues to be a barrier. Specifically, perceived social norms and attitudes have been shown to influence intention to implement evidence-based practices in substance abuse treatment centers.

Among the emerging treatment modalities being studied for implementation, exercise shows a promising ability to stimulate the same reward pathway as alcohol and other substances. To assess the utilization and implementation of exercise as a treatment regimen for substance abuse in treatment centers, attitudes, perceived social norms, and intentions were assessed for 100 treatment program staff across nine treatment sites. A multivariate linear regression model examined the associations between staff exercise behavior, attitudes, and perceived social norms with the intention to implement exercise as a therapy in treatment centers. Nearly three-quarters, or 71%, of the variance in intention to implement exercise could be explained by attitudes and social norms. Specifically, perceived social norms were positively and significantly associated with the intention to implement exercise ($p<0.01$).

Findings from this study suggest exercise behavior, attitudes, and perceived social norms are influential in counselor decision processes for the implementation and

utilization of exercise as a treatment for substance abuse. A social normative component should be considered in efforts to incorporate exercise as a treatment modality in substance abuse treatment centers.

1. INTRODUCTION

1.1 Treatment for Alcohol and/or Substance Abuse in the United States

As of 2013, an estimated 4.1 million persons annually aged 12 or older received treatment for illicit drug or alcohol use, while approximately 22.7 million needed treatment. Of the 4.1 million who received treatment, 2.5 million received treatment at a specialty facility (e.g., hospitals (inpatient only), drug or alcohol rehabilitation facilities, or mental health centers). The majority of persons (2.5 million) received treatment for alcohol use, with 746,000 reporting treatment for pain relievers and 845,000 receiving treatment for marijuana use. Among the 23 million in need of treatment, 908,000 perceived a need to treat their drug or alcohol use and 316,000 reported they made an effort to get treatment.(1) A meta-analytic review of psychosocial treatment interventions (i.e., cognitive behavioral therapy, contingency management, relapse prevention) representing 2,340 patients reported abstinence percentages across 34 randomized controlled trials of 31% (treatment) and 13% (control). More than one-third of participants had dropped out of the treatment program before completion.(2)

1.2 Treatment Services

There is no single comprehensive treatment approach for substance abuse. Substance abuse treatments are typically comprised of a combination of approaches, designed to meet the individual needs of the patient (e.g., type and severity of the substances used, presence of co-occurring mental and physical disorders, treatment setting, etc.). Some of the most widely recognized therapeutic approaches per evidence-based practices include: substance abuse counseling, relapse prevention,

cognitive-behavioral therapy, 12-step facilitation, motivational interviewing, anger management, brief intervention, contingency management/motivational incentives, trauma-related counseling, rational emotive behavioral therapy, Matrix Model, and community reinforcement plus vouchers.(3) Table 1 and the following paragraphs briefly review major treatment approaches and their level of use across 14,148 substance abuse treatment facilities responding to the 2013 National Survey on Substance Abuse Treatment Services (N-SSATS). It is important to note not all treatment facilities target the same populations with one technique, so while some facilities may report always using a particular technique, another facility may only sometimes employ that technique, and vice versa.

Substance abuse counseling is a versatile treatment approach, capable of targeting a variety of disorders on a short-term scale. The therapeutic approach encourages patients to discuss personal experiences and work through any interpersonal relationship issues, also referred to as the supportive and expressive techniques, respectively. Given the adaptability of substance abuse counseling, the 2013 N-SSATS found 94% of substance abuse treatment facilities used substance abuse counseling always or often.

Table 1
Summary of treatment approach frequency as reported in the 2013 N-SSATS Report for clinical or therapeutic approaches used by substance abuse treatment facilities.(3)

Treatment Approach	Always or Often	Sometimes	Rarely or Never	Not Familiar with This Approach
Substance Abuse Counseling	94%	4%	1%	1%
Relapse Prevention	84%	10%	5%	1%
Cognitive-behavioral Therapy	71%	21%	8%	1%
Motivational Interviewing	64%	24%	11%	1%
12-Step Facilitation	49%	25%	16%	1%
Anger Management	38%	43%	19%	0%
Brief Intervention	36%	43%	20%	1%
Trauma-related Counseling	30%	41%	28%	1%
Contingency Management/Motivational Incentive	27%	30%	40%	4%
Matrix Model	19%	20%	49%	13%
Rational Emotive Behavioral Therapy	16%	29%	51%	4%
Community Reinforcement Plus Vouchers	4%	8%	79%	9%

NOTE: Percentages may not add to 100 due to rounding.

Initially developed for the treatment of drinking problems, relapse prevention has been adapted for the treatment of other substance abuse disorders. The premise of relapse prevention is to facilitate an individuals understanding and correction of their learning processes which led to the maladaptive behavior. The cognitive-behavioral strategies utilized in relapse prevention are intended to enable abstinence and help prevent relapse. Relapse prevention is reportedly used always or often by 84% of substance abuse treatment facilities.

Cognitive-behavioral therapy (CBT) was used always or often by 71% of facilities, and sometimes by 21% in the 2013 N-SSATS questionnaire. This form of treatment can be performed on an individual level, in the presence of the patient's family, and/or in group settings. CBT encourages patients to recognize unconstructive patterns of thinking and reacting, and then, as an active participant in their own therapy, modify or replace those patterns with more beneficial ones.

Another counseling approach, Motivational Interviewing (MI), is designed to enhance the motivation to change. MI operates under the assumption that ambivalence is the primary obstacle to behavior change, thus the focus on boosting motivation as opposed to behavior change. More than half, 64%, of facilities used MI always or often, with 24% using it sometimes.

Based on the core principles of Alcoholics Anonymous (AA) and Narcotics Anonymous (NA), the 12-step facilitation approach encompasses behavioral, spiritual, and cognitive principles over 12 to 15 sessions. As a precursor to involvement in 12-step programs, this brief approach is designed to help patients accept their addiction and engage in a recovery process (i.e., follow a 12-step program).(4) Approximately 49% of substance abuse facilities reported using the 12-step facilitation always or often, with 25% sometimes using the approach.

Anger management is a three-fold intervention strategy, combining techniques from CBT, relaxation interventions, and communication skills. Clinicians utilize anger management intervention strategies in clients exhibiting concurrent substance abuse and anger problems. The intervention approach is designed to help individuals

recognize the triggers and signs of anger in a way that allows them to deal with those reactions in a more positive way. Anger management was always or often used by 38% of the substance abuse facilities, and sometimes used by 43% of facilities.

Brief intervention typically consists of one to five sessions and is designed to intervene at the stage just prior to a patient being diagnosed as substance dependent. Brief intervention examines the potential substance abuse problem and utilizes motivational techniques to actuate behavior modification. N-SSATS reported brief intervention was used always or often by 36% of facilities, and sometimes by 43%.

Trauma-related counseling was used by almost three-quarters of the substance abuse treatment facilities (always or often by 30% and sometimes by 41%). This technique is specific to patients suffering from post-traumatic stress disorder (PTSD) or other effects of trauma and abuse. In trauma-related counseling, patients are exposed to psychoeducation and skills-building, learning coping mechanisms and strategies for reducing trauma symptoms and reducing substance relapse.

Less than one third (27%) reported always using contingency management/motivational incentives, an approach which employs positive reinforcement. In contingency management/motivation incentives, patients are rewarded for positive actions taken toward their recovery. This treatment approach is reportedly rarely or never used by 40% of facilities.

Rational emotive behavioral therapy (REBT), Matrix Model, and community reinforcement plus vouchers were used rarely or never, or otherwise were unfamiliar approaches to the treatment facilities. Briefly, REBT is a therapeutic approach designed

to help patients replace their self-defeating actions, thoughts, and beliefs with life-enhancing alternatives. The Matrix Model is a rigorous, structured 16-week treatment program comprised from the research of many of the strategies previously discussed (i.e., CBT, relapse prevention, motivational interviewing, and 12-step facilitation). Community reinforcement plus vouchers employs an incentive program along with intensive outpatient therapy to help individuals focus on family relationships, skills to reduce dependency, and provides vocational training.(3)

1.3 Rationale for exercise as a treatment option

Through recent scientific advancements, the ability to explore and examine the human brain has lead to increased research supporting the notion exercise and substances activate similar pathways. Both positive (e.g., antidepressant, anxiolytic) and negative (e.g., overtraining) exercise induced mood effects have been demonstrated in humans. Specifically, examination of neurotransmitter biosynthesis has provided evidence of the positive mood effect achieved by exercise through the central serotonergic system. The serotonergic system is a system within the brain whose functions are carried out primarily by the neurotransmitter, serotonin. Numerous antidepressants and anti-anxiety (anxiolytic) medications are designed to target receptors within the serotonergic system.(5)

Alcohol and drugs target these same serotonin receptors via positive and negative reinforcement feedback systems. Positive reinforcement works by producing feelings of euphoria, while negative reinforcement works by alleviating symptoms of withdrawal and dysphoria. In addition to effect on mood, the changes in concentration of

amino acids found only within the serotonergic system in response to physical exercise supports the hypothesis that alcohol, drugs, and exercise have a related effect on the serotonergic system.(5, 6) More specifically, nonhuman primate studies suggest serotonin receptors of alcohol-preferring primates have a slower turnover rate (less activated state) prior to alcohol consumption. Following alcohol intake, serotonin turnover increased (more activated state). Cardiovascular exercise similarly activates the serotonergic system, thus potentially mitigating the intermediate variation of serotonin activity predisposing addicts to consume alcohol.(5, 7, 8) Furthermore, through reduced activation of the neurons in the serotonergic system responsible for uncontrollable stress, preliminary studies indicate running has a protective effect against the stressors often associated with depression, anxiety, and learned helplessness. Repeated pairing of an emotional state (i.e., stress) with the action of the addictive behavior can create a learned or conditioned behavior. Preventing the emotional state and/or replacing the emotional state/addictive behavior relationship has become the target for a number of treatment options.(6, 9)

Exercise has similar influences on the dopaminergic system. While alcohol, opiates, and cocaine all have varying mechanistic pathways for affecting the dopamine system, the effect in all mechanisms results in an increased concentration or prolonged activity of dopamine. Exercise is similarly associated with increases in dopamine receptors; however, rat models suggest the effect on the reward pathways is much more long lasting, capable of persisting for hours and possibly days after the physical activity has ended.(10-12)

1.4 Exercise as a stimulant reduction method in treatment programs

The combined need for new treatment regimens and exercise's promising ability to stimulate the same reward systems has lead researchers to evaluate exercise as a form of treatment for substance abuse. A number of studies have analyzed the effect of exercise on various addictions, including nicotine(13-18), opiates(19-23), and alcohol(24-29). In addition to the utility of exercise as a stimulant intervention, there are a number of other health domains generally impacted by substance abuse that stand to benefit from increased exercise (i.e., sleep disturbance, cognitive function, weight gain).

Exercise has been found to reduce cigarette consumption and craving over an acute time period, with moderate-intensity exercise delaying symptoms of withdrawal.(13, 15) Smoking habits appear to resume to their normal levels following the study period, with exercise activity simultaneously declining, making it difficult to extract any true impact exercise may have on smoking cessation over time.(13, 15)

Similar findings were reported when analyzing the effect of aerobic exercise as a treatment for drug dependence. While drug use generally decreased during the study period, at follow-up, use had gradually trended back to the user's normal levels.(20) Nevertheless, in a pilot study conducted by Brown et al. (2010) participants with reported abuse of drugs and alcohol were enrolled in an exercise intervention consisting of moderate intensity aerobic exercise, a group behavioral training component, and an incentive system. On average, participants attended 8.6 of the exercise sessions (out of 12) and engaged in an average of 209 minutes of physical activity per week. Paired t-tests comparing drug and alcohol use at baseline to the end of treatment and again at

three months post intervention found a significant increase in percent days abstinent (p=0.05).

1.5 STimulant Reduction Intervention using Dosed Exercise (STRIDE)

Trivedi et al. (2011) designed The STimulant Reduction Intervention using Dosed Exercise (STRIDE) study as a multisite (9 study sites) randomized, controlled trial evaluating treatment as usual with either exercise or health education in a stimulant abusing population. The primary aim of STRIDE was to compare the percent days abstinent between the High Dose Exercise Intervention (DEI) group and a Health Education Intervention Augmentation (HEI) group. Study sites within the National Drug Abuse Treatment Clinical Trials Network (CTN) Community Treatment Programs were chosen based upon the following characteristics: 1) residential stay ranging from 21 to 30 days, 2) no existing formal exercise program, 3) community outpatient treatment near the residential setting, 4) sufficient number of clients admitted to residential treatment on a monthly basis, and 5) adequate space for staff and site activities. Study participants included males and females, ages 18 to 65, diagnosed with stimulant abuse or dependence as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision [DSM-IV-TR]. After receiving medical clearance, participants randomized to the DEI arm exercised on a treadmill three times a week for 12 weeks with gradual increases in intensity (based on participant's target heart rate zone). Participants randomized to the HEI arm received treatment as usual in addition to educational sessions covering topics related to healthy eating, preventive health care, and accessing health care resources.(30)

Research assistants (RAs) staffing the study sites were trained and certified in the STRIDE trial protocol through a series of three periods: pre-training, in-person training, and post-training. Pre-training was conducted remotely over a two-to-four week period, with the intention of providing all RAs with the same background materials and context for recruitment, enrollment, and retention procedures. The in-person training spanned three days and covered the specific research and intervention procedures of the STRIDE trial. Lastly, the post-training session assisted the staff in their site preparation for the trial and conducted simulated patient walkthroughs. Staff training certification and evaluation were also part of the post-training period.(31) The Site Influence on Treatment Effects (SITE – CTN -0037-A-1) analysis utilized survey methodology to assess organizational and workforce variables (e.g., race, gender, clinician recovery status, smoking status, etc.) across study locations within the STRIDE trial. Prior to recruiting STRIDE study participants, counselors, research staff and program directors completed an assessment of characteristics, exercise habits, beliefs about exercise, attitudes toward exercise, opinions about 12-step groups, and a goal commitment scale related to the STRIDE protocol. Research staff also completed a walkthrough of the data collection processes with a simulated study participant.

1.6 Impact of organizational and workforce infrastructure on treatment outcomes

Research centers within the CTN serve as a platform for conducting multisite clinical trials in an effort to produce evidence-based practices for adoption across treatment centers. In fact, one of the goals and recommendations to emerge from the Institute of Medicine (IOM) report in 1998 was to continue the development and

dissemination of evidence-based practices for use among clinicians and within treatment centers.(32) Just as important as the trials being conducted for the development of evidence-based practices is the workforce behind the treatment programs being asked to implement these new practices. Level of staff support, skill, training, opinions and organizational factors can potentially contribute to the variation in development, adoption, and outcome of new treatment practices.

With the support of the CTN, and, in some cases, funding from the Center for Substance Abuse Treatment (CSAT) and SAMHSA, a number of studies evaluating the workforce and organizational variables have recently emerged.(33-44) In general, the treatment program workforce is predominantly female, approximately one-third having completed higher education (Masters and Doctoral), and with a portion of staff in recovery themselves (as high as 45% in one study).(35-39, 41-43) One systematic review of 65 research studies investigating the dissemination of evidence-based practices with substance abuse treatment programs found that, in general, affiliation with a research institute was positively correlated with attitudes toward pharmacological evidence-based treatments.(45) Similarly, multivariable regression models assessing the relationship between research affiliation and attitudes toward evidence-based practices found having higher levels of education and working in an organization with a research affiliation were associated with having more positive attitudes toward the usefulness of evidence-based practices.(42)

The barriers and facilitating factors to implementing evidence-based practices were further explored in a national study of 330 community addiction treatment centers.

Organizational factors such as training, staff skills and experiences with evidence-based practices, administrative support, and clinical supervision were identified as both barriers and facilitators to implementing evidence-based practices. Alternatively, while few client-related facilitating factors were identified, they were seen as significant barriers across four of the evidence-based practices evaluated.(37, 38)

In one of the most extensive evaluations of alcohol and substance abuse treatment staff, 3,418 counselors, managers/supervisors, and medical personnel participating in the CTN were invited to complete organizational, treatment unit, and workforce surveys. Survey responses were used to assess attitudes toward addiction medications and support for evidence-based therapies. Primary findings revealed higher education and medical staff were associated with higher levels of support for the use of medications. Additionally, individuals in managerial/supervisory roles and/or with graduate degrees tended to have more positive opinions about evidence-based practices when compared to staff with less education or in non-supervisory roles.(35, 39) Behavioral intentions, including attitude and perceived social norms, have also been shown to have a significant influence on intention to use medication across education level and counselor recovery status.(36) Similar findings were reported in a study assessing counselor characteristics, organizational characteristics, attitudes, perceived social norms and intentions to use a Web-delivered psychosocial intervention. Perceived social norms and attitude were both positively and significantly associated with intention to implement the new Web-delivered psychosocial intervention.(44) Interestingly, results from a confidential survey to determine staff attitudes towards

using new approaches and using more specific medications revealed 80% agreed new approaches should be used but less than 40% agreed medications should be used more.(46) Indeed, findings suggest there are generally more positive attitudes and support for psychosocial evidence-based treatments relative to pharmacological.(45)

These studies support current understanding of the gaps in communication and information exchange across treatment centers, researchers, clients, and the treatment community workforce. Barriers to evidence-based practice implementation include level of education, staff role (i.e., supervisory vs. counselor), recovery status, perceived social norms and attitudes. With the growing knowledge to address these gaps, further understanding and evaluation of the treatment community workforce is invaluable, particularly as new evidence-based practices develop. To date, treatment center staff and director opinions toward the incorporation of exercise in treatment programs have yet to be explored. Given the developing research for exercise as a treatment option, this study seeks to add to the current understanding of the gaps between research and practice, with particular reference to the utilization of exercise.

1.6.1 Treatment initiation, completion, and the Theory of Planned Behavior

The theory of planned behavior (TPB), a concept developed by Icek Ajzen, suggests the probability of engaging in a given behavior is determined by the individual's intentions. According to the theory, intention is a function of an individual's attitude, subjective norm, and perceived control. A number of studies have evaluated the theory as it pertains to treatment initiation or compliance.(47-50)

For example, Zenmore et al (2009) utilized the TPB behavior to model the psychological factors related to involvement in 12-step groups. While an individual's stated intention was not enough to predict one's involvement in 12-step groups, findings from the study did reveal attitude and perceived control had a direct impact on 12-step involvement.

More recently, the factors influencing treatment initiation and completion were assessed using the TPB. Attitude, subjective norm, behavior, and intention with respect to treatment completion were assessed for 200 participants enrolled in an outpatient alcohol and drug treatment program. Key findings from the study suggest attitude and behavioral control independently predict intention, while intention was positively associated with treatment completion.(49)

1.7 Counselor intention to utilize exercise as a treatment for substance abuse

Preliminary research has shown exercise as an intervention can reduce the desire to continue using or abusing alcohol, cigarettes, and/or illicit drugs.(13-23) While the sustainability of exercise intervention remains to be demonstrated, the success of acute exercise intervention documented by prior studies suggests a need for analysis of the intention to adopt such programs in treatment centers. The purpose of this study is to determine the influence of attitudes and social norms of counselors on their intention to adopt exercise as a treatment approach for substance abuse. A number of studies have identified individual characteristics of program staff as a significant factor in attitude and intention toward the implementation of evidence-based practices. Education level, job role, recovery status, and perceptions of stress are repeatedly identified as

characteristics having the greatest influence on an organization's ability to change.(35, 36, 39, 40, 42-44) Attitude and social norms have also been shown to have an effect on staff intentions and organizational change. Evidence of the effect of attitude and normative beliefs on intention has previously been demonstrated by the TPB behavior. Specifically, the theory suggests an individual's intention, which immediately precedes behavior, is based on their attitude and perceived social pressure.(51) Counselor exercise behavior, attitude, and perceived social norm toward the use of exercise intervention as a form of treatment may therefore be the strongest proponent for implementation. We anticipate counselors with strong exercise behavior, favorable attitudes, and positive social norms will have a stronger intention to adopt exercise as a stimulant reduction intervention when compared to their colleagues who engage in less physical activity and/or have less favorable attitudes and social norms.

2. METHODS

During site visits to the nine STRIDE community based treatment programs, eligible counselors, research staff and clinical supervisors/program directors (n=117) completed the SITE analysis assessing 1) demographics; 2) exercise behaviors and attitudes toward exercise, including incorporating aerobic exercise into residential treatment for stimulant abuse patients; 3) a combined measure of attitudes toward the STRIDE intervention, beliefs about social norms associated with exercise and substance abuse treatment, and intentions to incorporate the research protocol intervention into the organizational environment; 4) attitudes toward controversial aspects of the 12-step approach to therapy (included due to the measure's ability to capture theoretical orientation toward traditional versus emergent and novel models of substance abuse treatment); and 5) directors', research staff, and practitioner' commitment to the goal of incorporating the STRIDE intervention following the close of data collection. See Appendix A for a copy of the survey instrument administered to program staff. Oregon Health and Science University reviewed and approved the study protocol, and participants of the original STRIDE protocol voluntarily agreed to complete the survey.

2.1 Participant Demographics and Characteristics

Counselors, research staff, and clinical supervisors/program directors (n=117) completed either the Counselor Research Staff survey (n=103) or the Director Survey (n=14). The difference between the two surveys being that the Director Survey included assessments for Center and Staff Information and Treatment Population. Information

gathered during the demographic portion of the survey included gender, race, level of education, substance abuse treatment experience, recovery status, and cigarette use.

2.2 Exercise Behavior and Attitudes Survey (EBAS)

The Exercise Behavior and Attitudes Survey (EBAS) assessed current exercise habits, opinions on client willingness to engage in physical activity, and attitudes toward incorporating exercise as part of the treatment regimen within the staff's agency. Current exercise activity was determined via a yes/no response, with frequency and intensity of the exercise further explored for "yes" responses. Attitudes and opinions toward the implementation of exercise within the agency and among the agency's clients were determined from five-point scales (strongly disagree, disagree, neither agree or disagree, agree, strongly agree).

2.3 Attitude Social Norm Intention Survey (ASNIS)

The Attitude Social Norm Intention Survey (ASNIS) captured staff opinions surrounding the incorporation of exercise into substance abuse, exercise as a treatment for substance abuse, and social expectations for exercising. Sample prompts included "Incorporating exercise into treatment for substance abuse is:" and "People who are important to me think that exercise as a treatment for substance abuse treatment is effective." Attitudes were assessed using seven point semantic differential items (good/bad, useful/useless, and easy/hard), and social normative perceptions were scored on seven point likely/unlikely scales.

2.4 Attitudes About Controversial Aspects of 12 Step Groups (ACASG)

The Attitudes About Controversial Aspects of 12 Step Groups (ACASG) evaluated the staff's level of agreement toward some of the controversial aspects of the 12-Step group. For example, two of the statements read "The religious aspect of 12-Step groups is an obstacle for many," and "Clients can be re-traumatized or triggered in a 12-Step group." The level of agreement was assessed on a five-point scale (strongly disagree, disagree, neither agree or disagree, agree, strongly agree).

2.5 STRIDE Integration Goal Commitment Scale (SIGCS)

The STRIDE Integration Goal Commitment Scale (SIGCS) assessed the opinions about the STRIDE protocol and level of agreement with incorporating the protocol into the agency's practice. Some sample questions included "I am strongly committed to pursuing the goal of integrating the STRIDE protocol into our practice" and "Quite frankly, I don't care if I achieve the goal of integrating STRIDE into our practice or not." Similarly to the EBAS and ACASG portions of the survey, levels of agreement were determined on the same five-point scale (strongly disagree, disagree, neither agree or disagree, agree, strongly agree).

2.6 Data Analysis

Descriptive statistics were completed for each section of the survey (see Tables 2-4). Seventeen responses making up small sub-groups of the data set were removed from the data set to allow for the discernment of differences that may exist across respondent characteristics. Specifically, given the majority of respondents were either counselor supervisors or research staff, program directors and other respondents (n=15) were removed. Additionally, two respondents chose not to respond to the

recovery status question and were also removed. The final sample size used for all analyses was 100.

An imputation method, substitution of the mean, was used to address data points with missing values. Specifically, the imputation method substitution of the mean was used. The mean value for each question was computed for all individuals whose values for a particular variable were present. The computed mean value was then assigned to any observation with a missing value for that data item.(52) The total number of missing values across all four (EBAS, ASNIS, ACASG, SIGCS) surveys was 63. The proportion of missing values across all questions in the EBAS and ACASG surveys were less than 1%, 2% in the ASNIS survey, and 3% in the SIGCS survey. The entire survey (i.e., EBAS, ASNIS, ACASG, SIGCS) comprised 40 questions, 30 of which were missing at least one response. The maximum number of missing data for any one question was four (4%). A small portion (8%) of the total number of respondents represented 86% of the missing values (i.e., eight of the respondents did not provide answers to at least 5 of the of the questions in the entire survey). The greatest number of missing values for a single respondent was equal to nine.

The sections of the survey using a five-point scale (EBAS, ACASG, SIGCS) were assessed by assigning a score from 1-5, with 5 representing the most positive response. The ACASG section of the survey used a four-point scale; strongly agree to strongly disagree, with no neutral response category. The four-point scale was assigned a score from 1-4, with 4 representing the most positive response. Responses to survey questions with a negative connotation were reverse coded. For example, the responses

to the question “Including exercise as part of substance abuse treatment at this agency will be disruptive to the flow of usual activities *for clients*,” was reverse coded to reflect *Strongly Disagree* as the most positive response. Attitude, perceived social norm, and intention (i.e., the ASNIS section of the survey) were assessed using seven-point scales scored -3 to +3, with the positive end of the scale reflecting the positive side of the responses (good/useful/easy/likely).(36, 44, 51)

Responses were summed across observations for a total score on each section of the survey. The EBAS survey can be broken down into two sub-sections: the section of the survey eliciting exercise beliefs and the section of the survey eliciting attitudes toward exercise. Two total scores were thus calculated: a belief score and an attitude score. The EBAS belief score was based on the sum of five questions and ranged from 5 to 25. The EBAS attitude score was based on the sum of seven items and ranged from 7 to 35. Similarly, the ASNIS survey comprised an attitude, social norm, and intention section. Three questions made up the ASNIS attitude section with each question having three separate response scales (good/bad, useful/useless, easy/hard) for a total of three responses per attitude question. The three responses were summed for each question and ranged from -9 to +9. The ASNIS social norm score was based on three questions, with a separate score for each question, ranging from -3 to +3. (Note: Due to the range of responses to the attitude and social norm prompts, along with the differences in specificity of each question, investigators felt some of the smaller, potentially significant, differences in the responses would be lost by grouping the responses into one mean score.) The ASNIS intention score was based on one

question and ranged from -3 to +3. The attitude score toward controversial aspects of 12-step groups was based on nine questions and ranged from 9 to 36. Lastly, the SIGCS goal score was based on nine items and ranged from 9 to 45. Hereafter, the variables of the summed responses will be referred to as: 1) EBAS belief score, 2) EBAS attitude score, 3) ASNIS attitude score, 4) ASNIS social norm score, 5) ASNIS intention score, 6) ACASG attitude score, and 7) SIGCS goal score.

Based on the evidence for the effect of attitude and social norm on behavior, an interaction term between the ASNIS attitude score and ASNIS social norm score was created to test the hypothesis that the relationship between attitude on the intention of implementing exercise was different for likely and unlikely social norm responses. Specifically, the interaction assessed the attitude and social norm toward using exercise for the treatment of stimulant/(meth) amphetamine use.

Spearman Rank correlation coefficients were computed to assess the unadjusted correlations between the core components of the TPB (i.e., behavior, attitude, and social norms) and the primary outcome. The ASNIS intention score, specifically, the responses to the prompt “My program intends to include exercise as a treatment for stimulant/(meth) amphetamine abuse,” served as the dependent variable for all analyses. Measures of association were evaluated at an alpha level of 0.05. Highly correlated variables were evaluated for inclusion in subsequent analyses.

To further assess the associations with the intention to include exercise as a treatment for substance abuse, a multivariate model was fit to find the most parsimonious relationship between the dependent and independent variables using

various model building diagnostics (i.e., elimination procedures, residual tests, diagnostic plots, etc.). The independent variables analyzed included respondent demographics, EBAS behavior, EBAS belief scores, EBAS attitude scores, ASNIS attitude scores, ASNIS social norm scores, ACASG attitude scores, and SIGCS goal scores. The base model included the core components of the TPB (i.e., all behavior, attitude, and social norm scores). Demographic and workforce covariates were added and included in the final model if they contributed to the overall fit of the model. All analyses were conducted using SAS software. Copyright, SAS Institute Inc., a registered trademark of SAS Institute Inc., Cary, NC, USA (www.sas.com).

3. RESULTS

3.1 Participant Demographics and Characteristics

Mean age of the participants across all nine sites was 41.3 (standard deviation, 12.5) years with a range of 22 to 68 years. Participants were predominantly female (68%), of Caucasian race (69%), did not consider himself or herself to be in recovery (73%), and reported being a non-smoker (92%) (see Table 3). Counselors and clinical supervisors comprised 57% of the participant workforce. Education levels were fairly equal when comparing those with a graduate degree (45%) to those without a graduate degree (55%). Years of counseling experience were similarly equal, with a little less than half (48%) having more than five years of counseling experience. Lastly, nearly half (47%) of respondents noted the 12-step perspective informs their work very much.

Table 2
Respondent demographics and characteristics captured in the survey administered to treatment center staff prior to implementation of the STRIDE protocol.

Characteristics	**Total (n=100)**
Gender (%)	
Female	68.0%
Age	
Mean , years (±SD*)	41.3 (±12.5)
Range	22-68
Race (%)	
White	69.0%
Non-White	31.0%
Education (%)	
No graduate degree	55.0%
Graduate degree	45.0%
Job Role (%)	
Counselor or Clinical Supervisor	57.0%
Research Staff	43.0%
In Recovery (%)	
Yes	27.0%
No	73.0%
Smoker (%)	
Yes	8.0%
No	92.0%

*SD = Standard Deviation

3.2 Exercise behaviors and attitudes toward incorporating exercise in treatment programs

Among the 100 participants who completed the SITE survey, 76% reported currently engaging in physical exercise of moderate intensity (such as brisk walking/running/cycling) for a minimum of 20 continuous minutes, at least once per week. Of the 76% who responded "yes" to engaging in physical activity, participants reported exercising 2.83 (± 2.04) mean days per week for 27.6 (± 18.2) mean minutes per session.

Beliefs and attitudes toward exercise and implementing exercise were generally neutral or in agreement (Table 3). The mean EBAS belief score toward exercise in substance abuse treatment programs was 17.2 (±2.63), with a summed response range of 10 to 25. The summed EBAS attitude score toward the implementation of exercise in substance abuse treatment programs ranged from 19 to 35 with a mean score of 27.6 (±3.16). The EBAS attitude score equates approximately to an average response of agreement on the strongly disagree/strongly agree scale.

Table 3
Respondent physical activity behavior, belief score, and attitude score on the Exercise Behavior and Attitudes Survey section.

Exercise Behavior, Belief, and Attitude	**Total (n=100)**
EBAS 1: Engages in physical activity (%)	76%
EBAS 2: Mean number of days per week (± SD*)	2.83 (2.04)
EBAS 3: Mean number of minutes in one session (± SD)	27.6 (18.2)
Mean belief score toward exercise use in substance abuse treatment programs[†]	17.2 (2.63)
Mean attitude score toward implementing exercise in substance abuse treatment programs[§]	27.6 (3.16)

*SD = Standard Deviation
[†]Minimum and maximum possible score range of 5 to 25
[§]Minimum and maximum possible score range of 7 to 35

Figure 1
Distribution of summed exercise belief scores (range 5-25) for 100 respondents on the Exercise Behavior and Attitudes Survey.

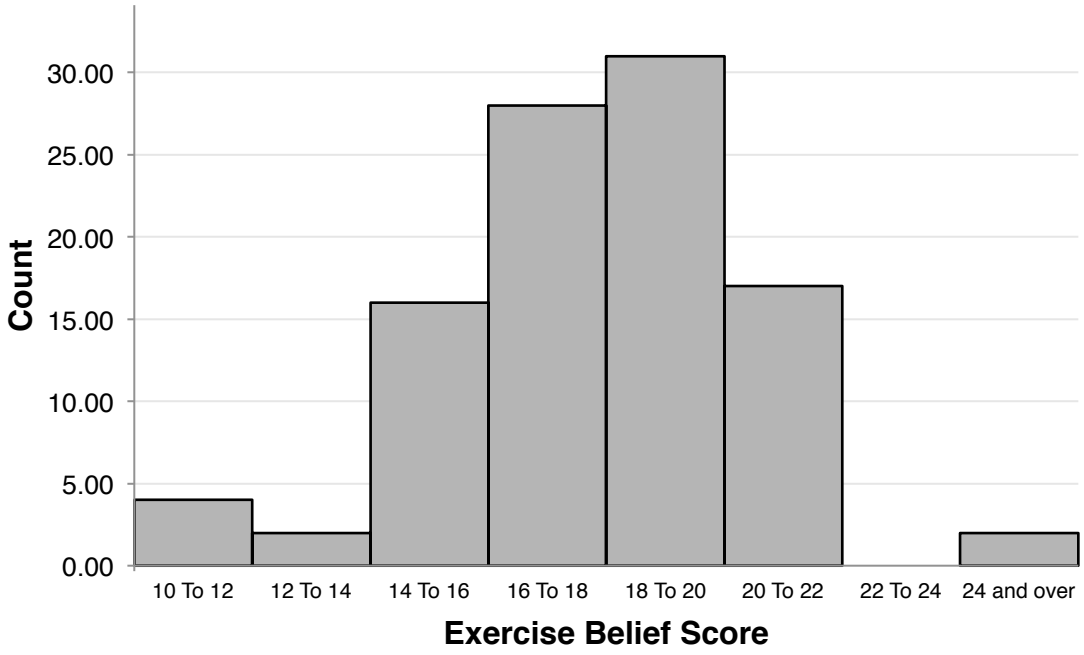
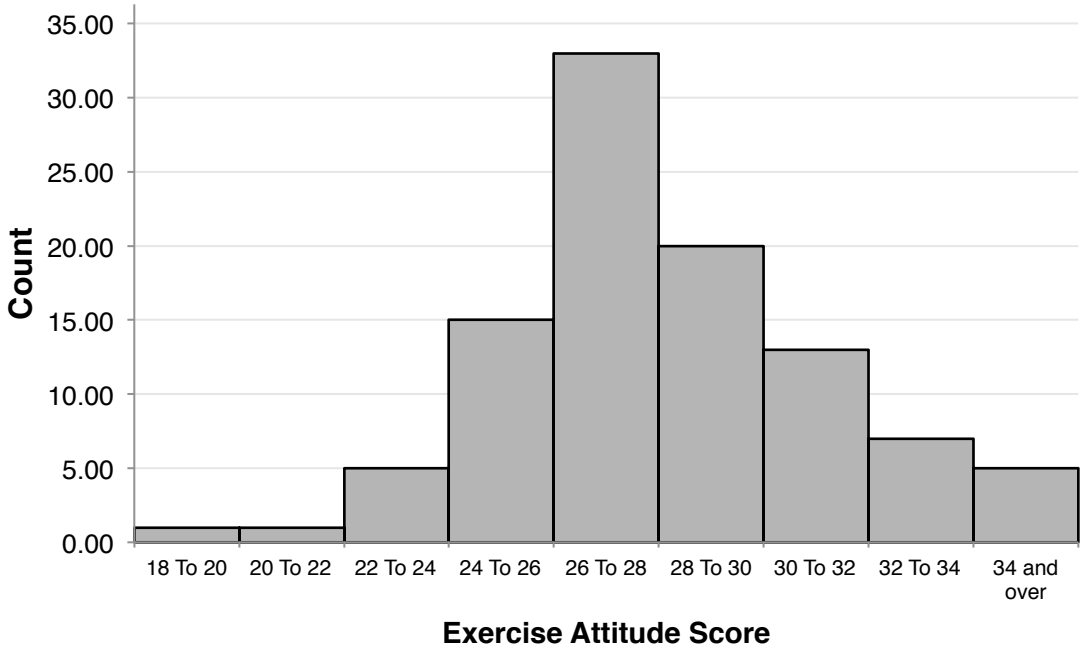


Figure 2
Distribution of summed exercise attitude scores (range 7-35) for 100 respondents on the Exercise Behavior and Attitudes Survey.



3.3 Attitudes, social norms and intentions toward the STRIDE protocol

Composite scores for the attitude toward exercise as a stimulant treatment ranged from -9 to +9. Overall, the respondent ASNIS attitude score was generally positive, with mean scores across all three prompts ranging from 5.27-6.26. This equates to an approximately one-unit difference from the maximum positive response (good, useful, easy). The mean ASNIS attitude score decreased slightly when the prompt specified treatment for stimulant/amphetamine abuse (5.27 ±3.67). With a minimum and maximum range of -3 to +3, perceived social norms had mean score responses of 0.88-1.44, which equates to a nearly two-unit difference of the maximum positive response (likely). Mean ASNIS scores for intention to include exercise as a treatment were less pronounced with a mean response of 0.85 (±1.75, -3 to 3). This

equates to a nearly three-unit decrease from the maximum allowed response (likely), and ultimately represents a neutral response to the intention to include exercise as a treatment for substance abuse. See Table 4 for the full statistics.

Table 4
Mean attitude, perceived social norm, and intention score to the Attitude Social Norm and Intention Survey

Attitude, Social Norm, Intention Group	Survey Prompt	Mean (± SD*)	Range
Attitudes toward exercise for stimulant treatment	ASNIS† 1: Incorporating exercise into treatment for substance abuse is good/bad, useful/useless, easy/hard.	6.26 (±3.14)	-6,9§
	ASNIS 2: Exercise as a treatment for stimulant/(meth) amphetamine abuse is good/bad, useful/useless, easy/hard.	5.27 (±3.67)	-9,9§
	ASNIS 3: Using exercise for treatment of substance abuse is good/bad, useful/useless, easy/hard.	6.04 (±3.30)	-8,9§
Perceived social norms toward exercise for stimulant treatment	ASNIS 4: People who are important to me think that exercise as a treatment for substance abuse is effective.	1.44 (±1.49)	-2,3¶
	ASNIS 5: People who are important to me think using exercise as a treatment for stimulant/(meth) amphetamine abuse is effective.	1.25 (±1.45)	-3,3¶
	ASNIS 6: People who are important to me think that using exercise for treatment of substance abuse is effective.	0.88 (±1.81)	-3,3¶
Intention to include exercise as a treatment for substance abuse	ASNIS 7: My program intends to include exercise as a treatment for stimulant/(meth) amphetamine abuse.	0.85 (±1.75)	-3,3¶

*SD = Standard Deviation
† ASNIS = Attitude Social Norm and Intention Survey
§ Minimum and maximum possible score range of -9 to +9
¶Minimum and maximum possible score range of -3 to +3

3.4 Controversial aspects of 12-step groups

The responses to the ACASG survey were summed to generate an attitude score, where higher scores represented greater disagreement to the prompts. The prompts in the ACASG survey have a negative connotation, thus disagreement indicates a positive attitude toward 12-step groups. The attitude scores across all sites ranged from 17 to 36, with 36 indicating the most positive attitude toward 12-step groups. The mean score across all sites was 25.0 (±4.14). This equates to an average response approximately one unit less than the maximum positive response (Strongly Disagree). In other words, respondents generally disagreed with the prompts regarding controversial aspects of 12-step groups.

3.5 STRIDE Integration Goal Commitment Scale

The responses to the SIGCS survey were summed to generate a commitment score, where higher scores represent a greater level of commitment toward implementing the STRIDE protocol. The commitment scores across all sites ranged from 27-45, with 45 representing the highest level of commitment toward implementing the protocol. The mean score across all sites was 35.8 (±4.63). This equates to an average response approximately one unit less than the maximum level of commitment. In other words, there was generally a high level of commitment among all respondents toward integrating the STRIDE protocol.

3.6 Unadjusted correlation between TPB predictors and the primary outcome

Intention to implement exercise was positively and significantly correlated with attitudes toward exercise for stimulant/(meth) amphetamine abuse ($r=0.27$, $p<0.01$),

attitudes for using exercise ($r=0.27$, $p<0.01$), as well as the social norms for exercise for the treatment of substance abuse ($r=0.28$, $p<0.01$), the treatment of stimulant/(meth) amphetamine abuse ($r=0.31$, $p<0.01$), and the use of exercise in substance abuse treatment centers ($r=0.80$, $p<0.01$).

The EBAS belief score was significantly and positively associated with the EBAS attitude score ($r=0.22$, $p=0.03$) and the ASNIS social norm ($r=0.23$, $p=0.02$) scores for the prompts for exercise being an effective treatment for substance abuse. There was no correlation, however, between the EBAS belief score and the ANSIS social norm score for the use of exercise as a treatment. The EBAS attitude score was positively and significantly associated with all other survey sections with the exception of the ACASG survey, in which the correlation was negative, though not significantly.

All ASNIS attitude and ASNIS social norm scores were positively and significantly associated. The ASNIS social norm scores for the responses to the prompts “People who are important to me think that exercise as a treatment for substance abuse treatment is effective” and “People who are important to me think using exercise as a treatment for stimulant/(meth) amphetamine abuse is effective” were highly and significantly correlated ($r=0.89$, $p<0.01$). Given the dependent variable of interest, the ASNIS intention score, is specific to the intention of including exercise as a treatment for stimulant/(meth) amphetamine abuse, the ASNIS social norm prompt specific to the treatment for stimulant/(meth) amphetamine abuse was included for further analyses. ASNIS attitude scores were positively and significantly correlated with the SIGCS goal

score. See Table 5 for the list of Spearman Rank correlation coefficients for the primary components of the TPB.

Table 5
Spearman rank correlation coefficients for the unadjusted correlation between the primary components of the theory of planned behavior (attitude, social norms, and intention) at an alpha level of 0.05.

	ASNIS* Intention	EBAS† Attitude	ASNIS 3	ASNIS 6
ASNIS Intention	1.00	0.18	0.27	0.80
		0.07	<0.01	<0.01
EBAS Attitude	0.18	1.00	0.42	0.23
	0.07		<0.01	0.02
ASNIS 3	0.27	0.42	1.00	0.40
	<0.01	<0.01		<0.01
ASNIS 6	0.80	0.23	0.40	1.00
	<0.01	0.02	<0.01	

*ASNIS = Attitude Social Norm and Intention Survey
†EBAS = Exercise Behavior and Attitude Survey

3.7 Multivariate analysis: Intention to include exercise as a treatment for substance abuse

3.7.1 Univariate and base model with primary TPB components

Attitudes and perceived social norm were positively and significantly associated with intention to use exercise in univariate models. Perceived social norm toward using exercise for treatment remained significantly and positively associated with intention to implement exercise after controlling for attitudes and other social norm responses. In the base model, 64% of the variance was explained by attitude and perceived social norm.

3.7.2 Model selection procedures

After including all predictor variables of interest in the model, age, ASNIS attitude, ASNIS social norm, and ACASG attitude scores were determined to have an association with the outcome, ASNIS intention, through forward and stepwise elimination procedures (R^2=0.69, Cp = 4.15). Specifically, the ASNIS attitude scores to the prompts “Incorporating exercise into treatment for substance abuse is good/useful/easy” and the ASNIS social norm score to the prompt “People who are important to me think that using exercise for treatment of substance abuse is effective” were determined to have an association. Age, mean exercise days per week, mean time spent exercising, ASNIS attitude, ASNIS social norm, ACASG attitude, and the interaction between ASNIS attitude and social norm were significantly associated with the dependent intention variable through backward elimination (R^2=0.71, Cp=6.1).

Through an all-possible regression selection procedure evaluating each independent variable’s association with the outcome, the same variables identified through backward elimination procedures were determined to have the greatest association. Based on the R^2, adjusted R^2, mean square error (MSE), and Mallow’s Cp criterion, the independent variables included in the model for further diagnostics were: age, mean exercise days per week (EBAS 2), mean time spent exercising (EBAS 3), the ASNIS attitude scores to prompts 1, 2, and 3, the ASNIS social norm score to prompts 5 and 6, the ACASG attitude score, and the interaction term between ASNIS prompts 2 and 5. See Table 6 for the top six linear regression model scenarios based on the aforementioned criteria.

3.7.3 Evaluating potential confounders

Prior studies have noted variations in attitudes toward evidence-based practice centers across education levels and job roles.(33, 35, 39, 41, 43) To assess job role and education as potential confounders, each variable was individually added to the final model and the regression coefficients of the unadjusted and adjusted models were compared for significant differences. Neither adjusting factor was found to have a significant influence and was therefore excluded from further analyses.

3.7.4. Model diagnostics

The overall F statistic for the model including the variables listed above was significant ($p<0.01$), suggesting the model explains a statistically significant variance. Using an alpha of 0.05, partial F-statistics suggest age, mean exercise days per week (EBAS 2), the ASNIS attitude scores to prompts 2 and 3, the ASNIS social norm score to prompt 5, and the interaction term did not explain a significant proportion of the variance given the other variables in the model. The model was re-run without the interaction term to assess the main effects of the ASNIS attitude score to prompt 2 and the ASNIS social norm score to prompt 5, however, removal of the interaction term decreased the variance explained by the main effects and was therefore left in the model. Stepwise exclusion of age, EBAS2, the ASNIS attitude scores, and the ASNIS social norm scores similarly decreased the variance explained by the remaining variables in the models.

Residual tests and diagnostic plots were performed to assess the validity of the model assumptions. The Durbin Watson test indicates the residuals are uncorrelated and the independent error assumption is satisfied ($d\approx 2$). The Q-Q plot (row 2, column 1

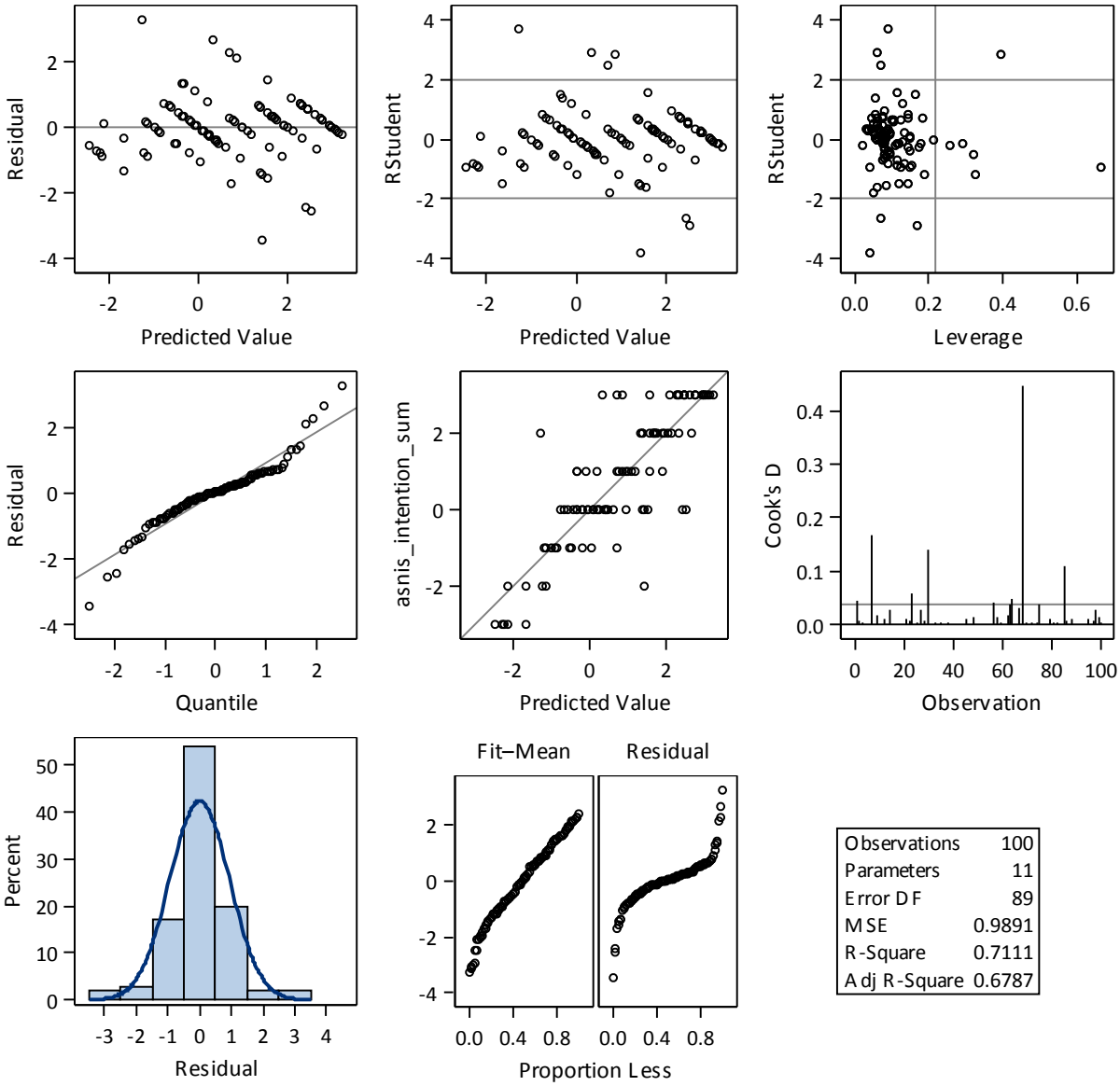
in Figure 3) showed a linear trend with a slight deviation in the tail, suggesting the normality assumption is satisfied. The distribution (row 3, column 1) similarly confirms the normality assumptions. The residuals plotted against the predicted values (row 1, column 1) shows a potential pattern, however the “cone” and “sphere” patterns are absent. Cook’s D (row 2, column 3) and the Studentized Residual vs. Leverage graph (row 1, column 3), shows some potential outliers and influential observations outside the reference lines.

Table 6
All possible models with the suggested independent variable(s) that are associated with the outcome based on the R^2, Adjusted R^2, MSE, Mallow's Cp, and PRESS criterion.

Variables in Model	R^2	Adj. R^2	Cp*	J(p)†	MSE§
Age EBAS2¶ EBAS3 ASNIS1** ASNIS2 ASNIS3 ASNIS5 ASNIS6 ACASG†† ASNIS2xASNIS5	0.71	0.68	6.50	1.10	0.99
Age EBAS2 EBAS3 ASNIS1 ASNIS2 ASNIS3 ASNIS5 ASNIS6 ACASG SIGCS§§ ASNIS2xASNIS5	0.71	0.68	7.62	1.12	0.99
Age Recovery EBAS2 EBAS3 ASNIS1 ASNIS2 ASNIS3 ASNIS5 ASNIS6 ACASG ASNIS2xASNIS5	0.71	0.68	7.75	1.11	0.99
Age Sex EBAS2 EBAS3 ASNIS1 ASNIS2 ASNIS3 ASNIS5 ASNIS6 ACASG SIGCS ASNIS2xASNIS5	0.72	0.68	9.00	1.12	0.99
Age EBAS2 EBAS3 Exercise Belief ASNIS1 ASNIS2 ASNIS3 ASNIS5 ASNIS6 ACASG SIGCS ASNIS2xASNIS5	0.72	0.68	9.01	1.12	0.99
Age Recovery EBAS2 EBAS3 ASNIS1 ASNIS2 ASNIS3 ASNIS5 ASNIS6 ACASG SIGCS ASNIS2xASNIS5	0.72	0.68	9.03	1.12	0.99

* Mallow's Cp
†PRESS criterion
§Mean Square Error
¶EBAS = Exercise Behavior and Attitude Survey
**ASNIS = Attitude Social Norm and Intention Survey
††ACASG = Attitudes About Controversial Aspects of 12 Step Groups
§§SIGCS = STRIDE Integration Goal Commitment Scale

Figure 3
Model fit diagnostics for the intention to include exercise as a treatment for substance abuse.



Two observations were identified in the data set as containing outliers. Removal of the outliers had an influential impact on the coefficients (>10% change) and were excluded from the final data set. Upon removal of the observations from the data set, the resulting R^2, Adjusted R^2, and MSE were 0.74, 0.71, and 0.90, respectively. With the outliers removed, this suggests the predictor variables explain 71% of the variability in

the intention to implement exercise. Lastly, it is unlikely multicollinearity exists among the predictors in the final model, as the mean variance inflation factor was equal to 2.35.

3.8 Final model for the intention to implement exercise in treatment centers

The final model is presented in Equation 1 and Table 7. Perceived social norms were positively and significantly associated with the intention to implement exercise ($p<0.01$). For every one-unit increase on the social norm scale, we would expect a 0.83 unit increase on the intention scale. Additionally, we are 95% confident intention with respect to implementing exercise increases between 0.71 and 0.95 units for every one-unit increase on the social norm scale.

Equation 1

Final equation of intention to implement exercise as a treatment for substance abuse.

$$y = 1.33 + 0.01 \cdot Age + 0.06 \cdot EBAS2 - 0.01 \cdot EBAS3 - 0.10 \cdot ASNIS1 + 0.06 \cdot ASNIS2 - 0.02 \cdot ASNIS3 - 0.02 \cdot ASNIS5 + 0.83 \cdot ASNIS6 - 0.05 \cdot ACASG + 0.01 \cdot ASNIS2 * ASNIS5 + \varepsilon$$

Table 7

Final multivariate model of intention to implement exercise as a treatment for substance abuse.

Variable	β	SE*	t Value	Pr > |t|	95% CL†		Adj. R^2	MSE§
Intercept	1.33	0.77	1.74	0.09	-0.19	2.85	0.71	0.91
Participant Age	0.01	0.01	1.04	0.30	-0.01	0.03		
Mean number of exercise days per week	0.06	0.07	0.75	0.45	-0.09	0.20		
Mean number of exercise minutes per week	-0.01	0.01	-0.99	0.33	-0.02	0.01		
Incorporating exercise into treatment for substance abuse is…¶	-0.10	0.06	-1.73	0.09	-0.22	0.02		
Exercise as a treatment for stimulant/(meth) amphetamine abuse is…¶	0.06	0.05	1.21	0.23	-0.04	0.15		
Using exercise for treatment of substance abuse is…¶	-0.02	0.05	-0.33	0.74	-0.13	0.09		
People who are important to me think using exercise as a treatment for stimulant/(meth) amphetamine abuse is effective (likely/unlikely).	-0.02	0.15	-0.14	0.89	-0.32	0.28		
People who are important to me think that using exercise for treatment of substance abuse is effective (likely/unlikely).	0.83	0.06	13.6	<0.01	0.71	0.95		
ACASG**, All prompts	-0.05	0.03	-1.80	0.08	-0.10	0.01		
Interaction term	0.01	0.02	0.55	0.59	-0.03	0.05		

*SE = Standard Error

†CL = Confidence Limit

§MSE = Mean Square Error

¶Assessed on three 7-point semantic differential scales: good/bad, useful/useless, and easy/hard.

**ACASG = Attitudes About Controversial Aspects of 12-Step Groups

4. DISCUSSION

Respondent demographics and characteristics were similar to those reported in other studies assessing the organizational and workforce characteristics of treatment centers.(33, 35-41, 44) The counselors and treatment center staff were relatively active and generally had positive beliefs and attitudes toward exercise and its incorporation within the staff's agency. Attitudes were similarly in agreement toward incorporating exercise as a stimulant treatment. However, counselors and treatment staff had more neutral assessments when prompted for their perceived social norms and intention to include exercise as a treatment. Despite the more neutral responses for intention, goal scores revealed a high level of commitment toward integrating the STRIDE protocol. The positive attitudes and goal commitment scores suggest an overall interest in the utilization of exercise in treatment centers. The perceived social norms, therefore, may be the biggest barrier to implementation. These findings are consistent with tests of the TPB with respect to treatment completion.(49)

Findings from this study suggest exercise behavior, attitudes, and perceived social norms are influential in counselor decision processes for the implementation and utilization of exercise as a treatment for substance abuse. The unadjusted correlation between the TPB predictors (attitudes and social norms) with the intention to implement exercise was positively and significantly associated. Univariate models confirmed these relationships. Furthermore, the perceived social norm toward using exercise for treatment remained significantly and positively associated with intention to implement exercise after controlling for attitudes and other social norm responses. These findings are consistent with Buti et al (2013) and Rieckmann et al. (2007). In the base model

containing the TPB components only, 64% of the variance in intention to implement exercise was explained by attitudes and social norms. Although exercise behaviors and attitudes were not significant in the final model, their inclusion in the model helped to explain the relationship between social norms and the intention to implement exercise. While 64% of the variance in intention to implement exercise was explained by attitude and social norm, 71% of the variance was explained with exercise behaviors and attitudes in the model. Counselor exercise behaviors and attitudes, therefore, help to explain the relationship between perceived social norm and the intention to implement exercise. The exercise behavior of the treatment staff indicated a relatively active group, with positive attitudes toward exercise and the use of exercise. Given the level of variance in the intention to implement exercise explained by the TPB components, staff behavior, attitudes, and perceived social norms will need to be taken into account when promoting exercise for treatment.

This study represents a unique analysis of intention given the respondents have engaged in the behavior they are considering for implementation (i.e., exercise). For example, studies could similarly evaluate intention to implement 12-step groups among the staff in recovery who have participated in 12-step groups compared to staff that aren't in recovery and haven't participated in 12-step groups. Is their intention to implement stronger (or weaker) based on their experience with the regimen? One question to consider is whether or not personal experience plays a role in intention, and, if so, is this something that needs to be considered in behavior modification and in the intention to engage in a behavior? Based on the TPB, attitude, subjective norm, and

behavioral control collectively represent an individual's intention to engage in a behavior. Thus, programs seeking to implement exercise as a treatment may be at a unique advantage to influence counselor social norms provided the behavior and attitudes toward exercise are already agreeable. Future research should seek to evaluate counselor perceived behavioral control. Prior studies(33, 35-41) have noted organizational factors as barriers to implementation of evidence-based practices. Counselor perceptions of factors within the workforce that may impede or facilitate their ability to implement exercise for treatment could thus provide further insight into the intention for such implementation.

There are a few limitations to consider in this study. The TPB does not account for other factors that may influence behavioral intention, such as fear, mood, or past experience. Due to the fact this study specifically evaluated exercise, an individual's past or current exercise experiences could bias their attitude or belief toward implementing exercise as a treatment. For example, an individual who is physically fit and has made routine exercise a lifestyle may reflect more positively on the benefits of implementing exercise for treatment. Conversely, individual's struggling with their health and/or physical activity levels may reflect more negatively on the potential benefits of incorporating physical activity into a treatment center. Including exercise behavior in the final model controlled for the potential bias from respondent activity behavior.

While current exercise behavior of the staff was captured in this study, a level of exercise behavior that indicates a routine activity level was not captured. In other words, an individual was considered to engage in physical activity if they engaged in 20

minutes of continuous physical activity at least once per week. The physical activity guidelines set forth by the U.S. Department of Health and Human Services and the World Health Organization to reduce the risk of chronic disease and depression in adults 18-64 years old recommend at least 150 minutes of moderate-intensity physical activity plus at least two days of strength training activities per week.(53, 54) Based on the average amount of physical activity reported, the mean number of minutes per week (78.1) for this cohort was approximately half of the recommended amount. Given that exercise as a treatment has shown more success in studies(13, 15, 19) where participants were actively engaged in monitored physical activity at least three days a week, the lack of matching activity level among the respondents in this study may underestimate their behavioral intention to implement exercise as a treatment. Further research should thus evaluate the differences in intention across varying activity levels of the treatment center staff. A longitudinal design would be more successful in capturing counselor exercise behavior and attitudes toward the adoption of exercise within their program.

The responses to all sections of the survey are self-reported, which inherently poses the potential for bias. Given the ongoing obesity epidemic, the societal push for increased physical activity, and the respondent's role as a healthcare provider, respondents may have felt pressured to provide a socially desirable response to their personal activity levels. The reported activity levels may therefore be an overestimate of the true activity levels.

A number of observations consistently had missing data on five or more of the survey questions. To control for the potential information bias, imputation based methods were used to substitute the mean value for the prompt for the missing value. Substituting the mean for missing values produces an expected value for that data point. Variances computed from this data can therefore be understated. However, the number of missing data points in this study represented less than 2% of the final data set, so the potential for the variance to be minimized should be minimal.

The population of the cohort in this study represented very little heterogeneity with more than half of the respondents being Caucasian females. However, other studies have reported the same or similar staff characteristics, suggesting the sample of this study is consistent and representative of treatment center staff.

Three semantic differential scales were used throughout the survey for this study (four-point, five-point, and seven-point). Positive, neutral, and negative responses equated to slightly different values on each scale. There were no steps taken in this study to adjust for the differences between the scales, which may impact the interpretation of the coefficients in the final model. Future analyses should seek to analyze the models both with and without the adjusted scales to truly assess the impact of the non-standardized values.

In conclusion, when taking into consideration attitude, behavior, and social norm, perceived social norm was the primary predictor of intention to implement exercise as a substance abuse treatment.

5. SUMMARY AND CONCLUSIONS

Preliminary research has shown exercise can reduce the desire to continue using or abusing alcohol, cigarettes, and/or illicit drugs. To determine the utilization and implementation of exercise as a treatment regimen for substance abuse in treatment centers, attitudes, perceived social norms, and intentions were assessed for 100 treatment program staff across nine treatment sites. Given that perceived social norms and attitudes have been shown to influence counselor and staff intention to implement evidence-based practices in substance abuse treatment centers, this study sought to determine the influence of attitudes and social norms of counselors on their intention to adopt exercise as a treatment approach for substance abuse.

A multivariate linear regression model was used to determine the relationship between staff exercise behavior, attitudes, and perceived social norms with the intention to implement exercise as a therapy in treatment centers. Nearly three-quarters, or 71%, of the variance in intention to implement exercise could be explained by attitudes and social norms. Specifically, perceived social norms were positively and significantly associated with the intention to implement exercise ($p<0.01$).

Perceived social norms were the primary predictor of intention to implement exercise as a substance abuse treatment and should be addressed in any efforts seeking to incorporate exercise as a treatment modality in substance abuse treatment centers.

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APPENDIX A.

Site Influences on Treatment Effects
Counselor Research Staff Survey Workbook

CTN 0037:

Stimulant Reduction Intervention using Dosed Exercise (STRIDE)

Table of Contents

Date_____ Participant ID#_____

SECTION A. DEMOGRAPHICS

1. **What is your gender?**
   ☐ Female ☐ Male

2. **Do you consider yourself to be Hispanic or Latino?**
   ☐ Yes ☐ No

3. **Please specify your race(s).**
   Check all that apply.
   ☐ American Indian or Alaskan Native
   ☐ Asian
   ☐ Black or African American
   ☐ Native Hawaiian or Pacific Islander
   ☐ White
   ☐ Other

4. **In what year were you born?** _____

5. **What is the highest degree or level of school that you have completed?**
   ☐ Up to 12th grade, no diploma
   ☐ High school graduate or equivalent (for example GED)
   ☐ Some college credit
   ☐ Associates degree
   ☐ Bachelor's degree
   ☐ Master's degree
   ☐ Doctorate degree

6. **What is your role in this agency?**
   ☐ Counselor or Clinical Staff ☐ Program or Agency Director/Investigator
   ☐ Research Staff ☐ Other _____

7. **Were you hired by your agency to assist with implementation of this protocol?**
   ☐ Yes ☐ No

8. **Where do you work most of the time?**
   ☐ Outpatient
   ☐ Intensive Outpatient
   ☐ Residential
   ☐ Detoxification
   ☐ Research
   ☐ Administration
   ☐ Clinical supervisor, program director, agency director
   ☐ Other _____

9. **How many years have you worked for this agency?**
   ☐ Less than 1
   ☐ 1 to 5
   ☐ 5 to 10
   ☐ 10 to 15
   ☐ 15 to 20
   ☐ 20 to 25
   ☐ More than 25

10. **How many years of substance abuse treatment counseling experience do you have?**
    [Include any time spent with clients (for example: internships)]
    ☐ None
    ☐ Less than 1
    ☐ 1 to 5
    ☐ 5 to 10
    ☐ 10 to 15
    ☐ 15 to 20
    ☐ 20 to 25
    ☐ More than 25

Date_____ Participant ID#_____

11. How many years of clinical supervision experience do you have?

☐ None ☐ 1 to 5 ☐ 10 to 15 ☐ 20 to 25
☐ Less than 1 ☐ 5 to 10 ☐ 15 to 20 ☐ More than 25

12. How many years of research staff experience do you have?

(Include time spent at other job site)

☐ None ☐ 1 to 5 ☐ 10 to 15 ☐ 20 to 25
☐ Less than 1 ☐ 5 to 10 ☐ 15 to 20 ☐ More than 25

13. How many years treatment program or agency director experience do you have?

(Include time spent at other job sites)

☐ None ☐ 1 to 5 ☐ 10 to 15 ☐ 20 to 25
☐ Less than 1 ☐ 5 to 10 ☐ 15 to 20 ☐ More than 25

14. What professional certifications, credentials, or licenses you have?

(Check all that apply)

☐ State counselor certification ☐ State counselor licensure ☐ Other: _____
☐ National counselor certification ☐ Professional certificate of proficiency ☐ None

15. How many years have you held the degree or professional credential most relevant to your current work?

☐ Less than 1 ☐ 5 to 10 ☐ 15 to 20 ☐ More than 25
☐ 1 to 5 ☐ 10 to 15 ☐ 20 to 25 ☐ N/A

16. Do you consider yourself to be a person in recovery from substance use?

☐ Yes ☐ No ☐ Choose not to respond

17. How much would you say that a 12-step perspective to substance abuse treatment informs your work in the field?

☐ Not at all ☐ Somewhat ☐ Very Much

18. Do you smoke cigarettes?

☐ Yes ☐ No

19. If yes, how many cigarettes do you smoke in a day?

☐ 1 to 5 ☐ 10 to 15 ☐ 20 to 25 ☐ 30 to 35 ☐ More than two packs
☐ 5 to 10 ☐ 15 to 20 ☐ 25 to 30 ☐ 35 to 40

Date_____ Participant ID#_____

SECTION B. EXERCISE BEHAVIOR & ATTITUDES SURVEY (EBAS)

1. Do you currently engage in physical exercise of moderate intensity (such as brisk walking/running/cycling) for a minimum of 20 continuous minutes, at least once per week?				Yes			No
2. If you responded **YES to #1**, How *many days per week* on average do you exercise?	1 day	2 days	3 days	4 days	5 days	6 days	7 days
3. If you responded **YES to #2**, what is the *average number of minutes* you exercise in one session?	20 minutes	25 minutes	30 minutes	35 minutes	40 minutes	45 minutes	50 or more minutes

For the following items please circle the option that best fits your response. In instances when one option does not completely fit your response, please choose the closest match. Do not circle more than one number. If you change your mind please draw a line through the item you do not want recorded and **circle the best**

Please circle the number indicating your level of agreement for each of the following statements.	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
4. Clients at this agency will want to exercise as part of their substance abuse treatment program.	1	2	3	4	5
5. Clients at this agency will adhere to the expected amount of exercise for a study *while in residential treatment.*	1	2	3	4	5
6. Clients at this agency will adhere to the expected amount of exercise for a study *while in intensive outpatient treatment*.	1	2	3	4	5
7. Clients at this agency will adhere to the expected amount of exercise for a study *while in aftercare*.	1	2	3	4	5
8. Clients being treated for stimulant/(meth)amphetamine abuse/dependence will adhere to a regimented exercise program as well as clients being treated for other drugs.	1	2	3	4	5
9. It is safe for stimulant/(meth)amphetamine clients to engage in aerobic exercise.	1	2	3	4	5
10. Aerobic exercise will benefit stimulant/(meth)amphetamine clients in similar ways that it can benefit someone suffering from depression.	1	2	3	4	5
11. Including exercise as part of substance abuse treatment at this agency will be disruptive to the flow of usual activities *for clients*.	1	2	3	4	5
12. Including exercise as part of substance abuse treatment at this agency will be disruptive to the flow of usual activities *for staff and practitioners*.	1	2	3	4	5
13. I would agree with including an indoor exercise option as part of treatment as usual for residential clients at this agency.	1	2	3	4	5
14. I would agree with including an at home exercise expectation as part of treatment as usual for intensive outpatient clients at this agency.	1	2	3	4	5
15. I believe exercise should be a priority for individuals in treatment for drug abuse/dependence.	1	2	3	4	5

Date_____ Participant ID#_____

option.

SECTION C. ATTITUDE SOCIAL NORM INTENTION SURVEY (ASNIS)

For the following items please circle the number between the two words that best fits your reflection on the statement. In instances when one option does not completely fit your response, please choose the closest match. Do not circle more than one number. If you change your mind please draw a line through the item you

Incorporating exercise into treatment for substance abuse is:								
Good	1	2	3	4	5	6	7	Bad
Useful	1	2	3	4	5	6	7	Useless
Happy	1	2	3	4	5	6	7	Sad
Exercise as a treatment for *stimulant/(meth) amphetamine* abuse is:								
Good	1	2	3	4	5	6	7	Bad
Useful	1	2	3	4	5	6	7	Useless
Happy	1	2	3	4	5	6	7	Sad
Using exercise for treatment of substance abuse is:								
Good	1	2	3	4	5	6	7	Bad
Useful	1	2	3	4	5	6	7	Useless
Happy	1	2	3	4	5	6	7	Sad
People who are important to me think that exercise as a treatment for substance abuse treatment is effective.								
Likely	1	2	3	4	5	6	7	Unlikely
People who are important to me think using exercise as a treatment for *stimulant/(meth) amphetamine* abuse is effective.								
Likely	1	2	3	4	5	6	7	Unlikely
People who are important to me think that using exercise for treatment of substance abuse is effective.								
Likely	1	2	3	4	5	6	7	Unlikely
My program intends to include exercise as treatment for substance abuse.								
Likely	1	2	3	4	5	6	7	Unlikely
My program intends to include exercise as a treatment for *stimulant/(meth) amphetamine* abuse.								
Likely	1	2	3	4	5	6	7	Unlikely

Date_____ Participant ID#_____

do not want recorded and **circle the best option.**

SECTION D. ATTITUDES ABOUT CONTROVERSIAL ASPECTS OF 12-STEP GROUPS (ACASG)

For the following items please circle the option that best fits your response. In instances when one option does not completely fit your response, please choose the closest match. Do not circle more than one number. If you change your mind please draw a line through the item you do not want recorded and **circle the best option.**

Please circle the number indicating your level of agreement for each of the following statements.	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
1. 12-Step groups can be too intense for some people.	1	2	3	4
2. The religious aspect of 12-Step groups is an obstacle for many.	1	2	3	4
3. The emphasis on "powerlessness" can be dangerous.	1	2	3	4
4. Clients can be re-traumatized or triggered in a 12-Step group	1	2	3	4
5. 12-Step groups can lead to pick up or relapse.	1	2	3	4
6. Clients can become dependent on 12-Step groups.	1	2	3	4
7. 12-Step group meeting leaders dominate the rest of the group.	1	2	3	4
8. 12-Step groups should seek professional guidance.	1	2	3	4
9. 12-Step groups can be dangerous: leaders are not professionally trained.	1	2	3	4

Date_____ Participant ID#_____

SECTION E. STRIDE INTEGRATION GOAL COMMITMENT SCALE (SIGCS)

For the following items please circle the option that best fits your response. In instances when one option does not completely fit your response, please choose the closest match. Do not circle more than one number. If you change your mind please draw a line through the item you do not want recorded and **circle the best option.**

We are interested in your opinions about the S-CAST protocol, as you best understand it, and how it might fit and be integrated into your program's ongoing treatment offerings. Please provide us with your honest opinion. There are no right or wrong answers to these questions.	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
1. I am strongly committed to pursuing the goal of integrating the STRIDE protocol into our practice.	1	2	3	4	5
2. I am willing to put forth a great deal of effort beyond what I'd normally do to achieve the STRIDE integration goal.	1	2	3	4	5
3. Quite frankly, I don't care if I achieve the goal of integrating STRIDE into our practice or not.	1	2	3	4	5
4. There is not much to be gained by trying to achieve the goal of integrating the STRIDE protocol into our practice.	1	2	3	4	5
5. It is quite likely that integration of the STRIDE protocol goal may need to be revised, depending on how things go in the next 3 months.	1	2	3	4	5
6. It wouldn't take much to make me abandon the STRIDE integration goal.	1	2	3	4	5
7. It's unrealistic for me to expect to reach the goal of integrating SRIDE as a practice.	1	2	3	4	5
8. Since it's not always possible to tell how tough the goal of integrating STRIDE as a practice is, it is hard to take this goal seriously.	1	2	3	4	5
9. I think the STRIDE goal is a good goal to shoot for.	1	2	3	4	5

Thank you for participating in this survey!

Your response are valuable and will assist in understanding how organizational and practitioner perspectives play a role in outcomes of clinical trials for improving the quality of care for substance abuse treatment.