

THE EFFECT OF SUBSTANCE USE TREATMENT ACTIVITY UTILIZATION ON
CHANGE IN RISK AND PROTECTIVE FACTORS ACROSS TREATMENT

By

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THESIS ABSTRACT

The Effect of Substance Use Treatment Activity Utilization on Change in Risk and Protective Factors Across Treatment

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Substance use treatment programs have begun supplementing standard, mandatory clinical practices with activities that seek to improve overall quality of life and ease transition back to the real world. Support groups, family involvement opportunities, physical activities, and artistic instruction all hold promise for supporting recovery in individuals with substance use disorder (SUD). However, little is understood about the extent to which individuals voluntarily participate in these activities during treatment, and how participation affects treatment outcomes. In the current study, data from an inpatient substance use treatment program were analyzed to examine the degree to which individuals take advantage of the voluntary treatment tools offered at the facility, and the association between utilization of activities and treatment outcomes as measured by protective and risk factors for substance use. A repeated measures general linear model identified a significant interaction effect between time and overall utilization of voluntary activities on risk factors for substance use, $F(1, 251) = 4.05, p < .05$, such that greater utilization was related to greater reductions in risk factors. Overall utilization was not related to protective factors, $F(1, 251) = 1.57, p = .21$, nor was utilization of individual activities related to risk or protective factors, with one exception: utilization of AA

meetings was significantly associated with greater reductions in risk, $F(1, 193) = 4.59, p < .05$. Taken together, these findings suggest that overall utilization of voluntary activities may be more critical for reducing risk factors during inpatient treatment than bolstering protective factors.

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The Effect of Substance Use Treatment Activity Utilization on Change in Risk and Protective Factors Across Treatment

Substance use disorder (SUD) is pervasive in the United States, affecting 20.1 million people ranging from adolescents, as young as 12 years old, through adults (Substance Abuse and Mental Health Services Administration, 2017). There are many evidence-based treatment models available to those with an SUD who seek to reduce or abstain from the use of substances. These models are typically multi-faceted, and include both mandatory (e.g., drug testing, counselor engagement) and voluntary (e.g., exercise, social events) elements. Such approaches are thought to further promote engagement in the treatment process and positive outcomes following treatment.

The main objective of SUD treatment is to support long-term recovery by helping clients manage triggers for substance use. This can be accomplished by increasing protective factors (e.g., sober support, self-efficacy) and reducing risk factors (e.g., cravings, poor physical health, social conflict; NIDA, 2002). The current SUD treatment literature provides evidence that supplementing clinical treatment with intervention tools such as support groups, familial involvement, physical activity, and artistic instruction supports recovery by combatting negative psychological (i.e., emotions and temptations) and environmental factors (i.e., social and situational triggers) that encourage substance use behavior. However, not all individuals who attend treatment take advantage of these supplemental activities and it is unclear whether the quantity of utilization is important for outcomes. This study aims to address this gap by examining the utilization of voluntary treatment activities, and the effect of this utilization on changes in protective and risk factors of clients attending an inpatient treatment program.

Substance Use Treatment Activities

Support Groups

A main aspect of substance use treatment is identifying sources for support both within and outside of treatment. Alcoholics Anonymous (AA) meetings, broadly referred to as “12 Step” or “mutual help” approaches, are one of the most well-known and commonly practiced support groups (Alcoholics Anonymous, 2014). These peer-led activities have been shown to effectively support recovery in individuals with SUD. Exposure to various support groups is an important element of treatment, as it can scaffold engagement in mutual help programs after treatment and likely increase the chances of sustained recovery.

In a large, multi-site sample of substance use treatment seeking individuals receiving targeted interventions through Project MATCH, AA meeting attendance predicted greater self-efficacy, a factor strongly related to positive treatment goals (Bates, Pawlak, Tonigan, & Buckman, 2006). More recently, a quantitative meta-analysis found a positive correlation between AA meeting attendance and abstinence in individuals with co-occurring mental health issues and SUD (Tonigan, Pearson, Magill, & Hagler, 2018). A systematic review of the efficacy of SUD treatments on symptom reduction and abstinence promotion suggested that AA meetings were equally efficacious as commonly used, evidence-based treatments such as CBT (Kelly, Humphreys, & Ferri, 2020). These findings suggest that inclusion of support group activities during inpatient treatment may help individuals with SUD incorporate mutual support in everyday life to buffer the effects of potential risk and dampen substance use behavior post-treatment.

Social Support

Supportive relationships within an individual's existing social network can serve as protection against substance use. Substance use reductions post-treatment were largest for treatment seeking individuals with frequent, positive social support compared to those with few sources of positive support or negative forms of support (Buckman, Bates, & Morgenstern, 2008). In addition, the number of sober support members in the social network was positively associated with self-efficacy for substance use abstinence in residents of a sober living community (Stevens, Jason, Ram & Light, 2015). Within the social network, positive family relationships may be especially beneficial for long-term recovery. In a study of young adult men who reported recent misuse of substances, perceived family support was inversely associated with polydrug use (Kecojevic, Basch, Kernan, Montalvo, & Lankenau, 2019). Positive family support also predicted reduced substance use in a sample of individuals who were once incarcerated (Spjeldnes, Jung, Maguire, & Yamatani, 2012). The amount, quality, substance use status, and type of the relationships in the social network, specifically close members such as family, influence perceived capacity to, and objective measures of, reduced substance use.

Physical Activity

Beyond clinical and social influences, lifestyle factors may also contribute to positive substance use treatment outcomes. Exercise has been shown to reduce symptoms of SUD across substances such as tobacco (Martin et al., 1997; Marcus et al., 1999), stimulants (Trivedi et al., 2011), and marijuana (Buchowski et al., 2011). Exercise appears to influence changes in substance use behaviors through its effects on both physical and psychological health. In a study of female cigarette smokers, women in the exercise condition exhibited longer-term smoking cessation than women in the control

group (Marcus, Albrecht, Niaura, Abrams, & Thompson, 1991). In a study of young (15-21 years old) inpatient residents, exercise was found to reduce substance use craving and associative patterns of behavior (More et al., 2018). In a meta-analysis of individuals with SUD, participants in various exercise conditions experienced longer periods of abstinence than the control groups and exercise reduced substance use and mental health symptoms, specifically for major depressive disorder (MDD) and anxiety (Ashdown-Franks et al., 2019). Taken together, these results suggest that exercise can influence substance use behaviors independent of, as well as in addition to, mental health disorders.

Yoga is also a physical intervention that is frequently used in substance use treatment. Individuals in the experimental condition of a hatha yoga intervention exhibited lower substance use behavior than the control group in a sample of individuals who were HIV positive (Wimberly, Engstrom, Layde, & McKay, 2018). In a sample of women seeking substance use treatment for opiates, quality of life and mood significantly increased for individuals in the six-month yoga intervention group compared to the control group (Zhuang, An, & Zhao, 2013). These studies argue for the inclusion of physical activity interventions in SUD treatment to integrate constructive behaviors into an individual's lifestyle, thereby potentially increasing quality of life and replacing substance use.

Artistic Instruction

Another activity that intends to provide an alternative outlet to substance use is art. A number of substance use treatments are incorporating art into therapeutic techniques (Aletraris, Paino, Edmond, Roman, & Bride, 2014). Very few quantitative studies have been conducted in this area, as much of the literature on art therapy in

substance use treatment uses qualitative techniques. However, a recent publication empirically measured the efficacy of the Literacy-Free 12 Step Expressive Arts Therapy curriculum, a program that employs artistic outlets in combination with common evidence-based therapeutic processes (Stuebing, Lorenz, & Littlefield, 2020). Positive attitudes and beliefs towards recovery increased from the start to the end of the treatment program for individuals who received the expressive art therapy in combination with substance use treatment as usual. Additionally, these individuals had a greater likelihood of treatment completion and interest in continued care than those who were not exposed to the art therapy program. Although more research is needed in this area, art potentially serves as a positive replacement for substance use.

Treatment Utilization & Engagement

Reputable, evidence-based treatment facilities offer a wide range of tools to guide and support patients such as support groups, AA-type mutual help meetings, family visits, exercise facilities and classes, and art classes. These efforts aim to promote an active and well-balanced lifestyle through increasing self-efficacy, positive family, peer, and professional relationships, and providing a purposeful focus other than substance use behaviors. It is common today for evidence-based agencies to offer these tools as voluntary activities to foster autonomy in choosing an individualized and efficacious treatment path. This independence is intended to create a sense of ownership over the recovery process. Given the extreme challenges, particularly high dropout rates, related to substance use treatment, this freedom serves to promote treatment engagement, a critical element in ensuring the full beneficial effects of a given SUD program (Vogel, Ly, Ramo, & Satterfield, 2020).

One way engagement can be measured is by assessing utilization of the resources available at the facility. This also would allow treatment providers to better understand which specific activities are being utilized, and whether offering voluntary options positively affects outcomes. Assessing utilization is important to explore, as evidence suggests that individuals who engage in treatment early on stay in treatment longer and have better treatment outcomes than those who receive less treatment opportunities at the beginning of treatment (Crevecœur-MacPhail et al., 2010). In addition, utilization information is important for agency administrators to use in optimizing resources and staff, and prioritizing treatment tools that clients are willing to engage in and are most likely to benefit from. Thus, ensuring the utilization of treatments that have exhibited effectiveness could aid in improving the quality of treatment for SUD and ultimately promote long-term recovery of those seeking treatment.

Current Study

There are effective interventions for individuals with SUDs; however, these interventions work only for some people and in some circumstances (Martin & Rehm, 2012). Treatment agencies have begun to expand treatment offerings, but there remains a gap in understanding whether clients use voluntary intervention tools and the degree to which these tools affect SUD outcomes. The current study examines the effects of utilization of specific voluntary treatment activities on changes in risk and protective behaviors during treatment. Frequency of participation was tracked daily for six activities: AA meetings, specialty group meetings (e.g., specific to racial, ethnic, sexual orientation, and gender identity), gym, yoga, art, and family visits. Treatment utilization was operationalized as a proportion of participation to availability of the activities.

Outcomes were assessed using two composite scores from the Brief Addiction Monitor (BAM): risk (e.g., craving, physical health, sleep, mood, risky situations, and social conflict) and protective (e.g., self-efficacy, spirituality, work/school participation, income, and sober social support) factors. To determine the effects of treatment utilization on addiction outcomes, two hypotheses were proposed:

Hypothesis 1: Higher activity utilization would predict greater decreases in risk factors from treatment intake to discharge.

Hypothesis 2: Higher activity utilization would predict greater increases in protective factors from treatment intake to discharge.

Method

Participants

The sample consisted of 700 clients of a private, inpatient substance use treatment program in New Jersey. The statistical analysis only included participants with complete data (i.e., outcome data at both time points and activity data). Admission information was obtained for this subset of the main sample ($n=254$). On average, participants stayed in treatment for 25 days ($SD=9.02$). The majority of clients were discharged successfully (93%, $n=236$) however, 4% left treatment against medical advice ($n=10$), 2% were discharged by the clinical administration ($n=6$), and 1% transferred from this facility to another ($n=2$). Although demographic information was not available for this specific sample, the treatment program typically treats White individuals in their mid-40s, approximately 70% male and 30% female. For participants who attended treatment more than once ($n=32$), data from the first admission were used in the current study.

Procedure

Data were collected as part of a program evaluation performed by the Rutgers University, Center of Alcohol and Substance Use Studies. All clients attending the residential inpatient program at the facility from April 2017-December 2018 were included in the current study using a purposive sampling technique. On the day of treatment admission, clinical staff assessed substance use risk factors and protective factors using the Brief Addiction Monitor (BAM; Cacciola et al., 2013). This survey was administered again on the day of treatment discharge. Between intake and discharge, clients' participation in voluntary activities was recorded each day by treatment staff. Clients were also given the opportunity to complete work or school requirements on a laptop occasionally, under supervision, but these activities were not directly tracked.

Adherence to Ethical Guidelines

Information was initially collected as part of a program evaluation and thus were not regarded as research data. No consent was obtained and no participant compensation was provided at the time of data collection. This study proposed secondary correlational analyses of this information. As such, it is now considered archival data. However, no adverse events are anticipated due to the secondary longitudinal survey analysis design of this study and risk is expected to be "less than minimal" to the participants. Therefore, approval has been obtained from the Institutional Review Board (IRB) at the level of expedited review for data analysis.

Measures

Independent Variable

Voluntary Participation. A form developed by researchers at the Rutgers Center of Alcohol and Substance Use Studies was implemented as a tool for clinical staff to

track client participation in treatment activities. On the top of the form is the unique client identification number, the date of the study week, and a key legend for the completion of the participation grid. Below this information is a square grid listing the treatment activities in a column on the left-hand side, and listing the days of the week (Monday-Sunday) in a row across the top. If the participant attended an activity, a “1” was placed in the box on the grid for that day. If the participant was able to attend the activity but chose not to, a “0” was placed in the box for that day. If the participant was unable to utilize the activity due to admission or discharge date, disciplinary restrictions, conflicting obligations (e.g., individual therapy session, medical appointment), or the activity was not offered by the treatment facility, an “X” was placed in the box for that day. Voluntary utilization proportion was calculated for each of the activities using a sum of the frequencies of participation (participated=1; did not participate=0) divided by the sum of activities that were available (X coded as 9=unavailable; 0 or 1=available) to obtain a total utilization proportion. A form was completed for each week that a client was in treatment. Clinical staff tracked participation daily for each of the eleven activities.

Mandatory activities included room checks, chores, mentor assignments, and mentor meetings, and were not included in the present analyses. Six voluntary activities will be utilized to test the hypotheses: gym usage, yoga class, AA meetings (i.e., support group) meetings, specialty group meetings, art class, and family visits. One voluntary activity “off-site trips” was not included due to the variability of activities. Gym participation was counted as utilizing the exercise facility at the treatment center, which was available daily. Instructor-led yoga classes were offered twice per week. Art class

was offered once per week. Big Book meetings, which are standard, peer-led support groups that use the Alcoholics Anonymous book as a reference (Alcoholics Anonymous, 2014), were offered daily. Specialty group meetings, groups that offer peer support specific to race, ethnicity, gender, and sexual identities, were held approximately once per week, but this varied based on need. The opportunity for family members to visit the facility was available twice per week.

Dependent Variable

Treatment Outcomes. The Brief Addiction Monitor (BAM) is a clinical tool developed and widely used by Veterans Affairs (Cacciola et al., 2013). This 17-item survey is used to determine change in factors that influence substance use with three composite scores: risk (see Table 1), protection (see Table 2) and overall drug use, which was omitted from analysis in the current study due to lack of use during inpatient treatment. At intake, the questionnaire directs responses to the past thirty days. At discharge, the survey queries the past seven days. This study uses composite scores for the risk and protection subscales. The survey administered at intake served as the first time point and the survey administered at discharge served as the second time point. Risk and protective factor scores have shown to be valid and reliable in previous research ($\alpha=.78$, $\alpha=.71$; Cacciola et al., 2013).

Table 1

Risk Factors

Items	Intake (30 days)	Discharge (7 days)
<i>In the past X days, how much were you bothered by cravings or urges to drink alcohol or use drugs?</i>	<i>0=Not at all</i> <i>1=Slightly</i> <i>2=Moderately</i> <i>3=Considerably</i>	<i>0=Not at all</i> <i>1=Slightly</i> <i>2=Moderately</i> <i>3=Considerably</i>

	4=Extremely	4=Extremely
<i>In the past X days, would you say your physical health has been?</i>	0=Excellent 1=Very good 2=Good 3=Fair 4=Poor	0=Excellent 1=Very good 2=Good 3=Fair 4=Poor
<i>In the past X days, how many nights did you have trouble falling asleep or staying asleep?</i>	0=0 days 1=1-3 days 2=4-8 days 3=9-15 days 4=16-30 days	0=0 days 1=1 day 2=2 days 3=3 days 4=4 or more days
<i>In the past X days, how many days have you felt depressed, anxious, angry or very upset throughout most of the day?</i>	0=0 days 1=1-3 days 2=4-8 days 3=9-15 days 4=16-30 days	0=0 days 1=1 day 2=2 days 3=3 days 4=4 or more days
<i>In the past X days, how many days were you in any situations or with any people that might put you at an increased risk for using alcohol or drugs (i.e., around risky “people, places or things”)?</i>	0=0 days 1=1-3 days 2=4-8 days 3=9-15 days 4=16-30 days	0=0 days 1=1 day 2=2 days 3=3 days 4=4 or more days
<i>In the past X days, how much have you been bothered by arguments or problems getting along with any family members or friends?</i>	0=Not at all 1=Slightly 2=Moderately 3=Considerably 4=Extremely	0=Not at all 1=Slightly 2=Moderately 3=Considerably 4=Extremely

Note. Composite score of risk factors comprises six items concerning substance use

craving, physical health, sleep, mood, risky situations, and social conflict. Higher risk scores indicate greater risk factors.

Table 2

Protective Factors

Items	Intake (30 days)	Discharge (7 days)
<i>How confident are you in your ability to be completely abstinent (clean) from alcohol</i>	0=Not at all 1=Slightly	0=Not at all 1=Slightly

<i>and drugs in the next X days?</i>	2=Moderately 3=Considerably 4=Extremely	2=Moderately 3=Considerably 4=Extremely
<i>In the past X days, how many days did you attend self-help meetings like AA or NA to support your recovery? ^a</i>	0=0 days 1=1-3 days 2=4-8 days 3=9-15 days 4=16-30 days	0=0 days 1=1 day 2=2 days 3=3 days 4=4 or more days
<i>Does your religion or spirituality help support your recovery?</i>	0=Not at all 1=Slightly 2=Moderately 3=Considerably 4=Extremely	0=Not at all 1=Slightly 2=Moderately 3=Considerably 4=Extremely
<i>In the past X days, how many days did you spend much of the time at work, school, or doing volunteer work?</i>	0=0 days 1=1-3 days 2=4-8 days 3=9-15 days 4=16-30 days	0=0 days 1=1 day 2=2 days 3=3 days 4=4 or more days
<i>Do you have enough income (from legal sources) to pay for necessities such as housing, transportation, food and clothing for yourself and your dependents?</i>	0=No 4=Yes	0=No 4=Yes
<i>In the past X days, how many days were you in contact or spent time with any family members or friends who are supportive of your recovery?</i>	0=0 days 1=1-3 days 2=4-8 days 3=9-15 days 4=16-30 days	0=0 days 1=1 day 2=2 days 3=3 days 4=4 or more days

Note. The composite score of protective factors comprises five items related to self-efficacy, religion/spirituality, work/school participation, income, and sober social support. Higher protective scores indicate greater protective factors.

^a Excluded from analysis due to confound with activity variable.

Results

Table 3***Descriptive Values of Treatment Outcomes***

BAM Risk Items	Intake <i>M(SD)</i>	Discharge <i>M(SD)</i>	Clients Showing Decrease (%)
Risk Factors Total ^a	11.92 (5.35)	3.95 (3.47)	91
Substance Use Cravings ^b	2.11 (1.41)	.42 (.70)	77
Physical Health ^b	2.18 (1.01)	1.08 (1.04)	67
Trouble Sleeping ^b	2.05 (1.47)	.87 (1.45)	60
Negative Mood ^b	2.29 (1.45)	1.2 (1.47)	59
Risky Situations ^b	1.75 (1.51)	.1 (.55)	65
Social Conflict ^b	1.54 (1.38)	.29 (.78)	65
BAM Protection Items	Intake <i>M(SD)</i>	Discharge <i>M(SD)</i>	Clients Showing Increase (%)
Protective Factors Total ^c	13.16 (3.82)	15.97 (3.72)	72
Abstinence/Self-Efficacy ^b	3.43 (.90)	3.70 (.67)	31
Self-Help Meetings ^{bd}	2.26 (1.50)	3.94 (.42)	72
Spiritual Support ^b	2.16 (1.46)	2.93 (1.25)	52
Work & School ^b	2.66 (1.57)	3.2 (1.45)	42
Adequate Income ^b	2.36 (1.97)	2.6 (1.91)	13
Social Contact ^b	2.56 (1.33)	3.53 (1.00)	58

^aRisk is a composite score composed of the six risk factor items listed. Risk composite scores range from 0-24; each of the six items are rated on a scale from 0-4.

^b Each of the individual BAM survey items is rated on a scale from 0-4. For risk factors, a lower score indicates lower risk. For protective factors, a higher score indicates a greater amount of protection.

^c Protection is a composite score composed of five out of the six protective factor items listed. Self-help meetings were removed from this composite score because it is confounding with an outcome measure used in the analysis. Protection composite scores range from 0-20; each of the five items are rated on a scale from 0-4.

^d Removed from protection composite score used in analysis due to the confounding outcome measure of text meeting attendance.

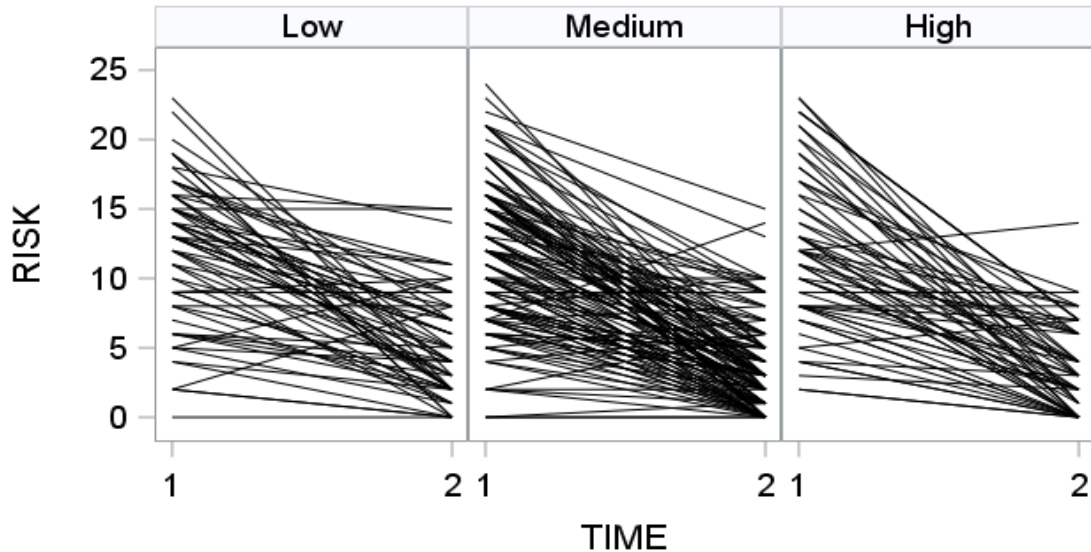
Table 4***Utilization and Participation in Voluntary Treatment Activities***

Treatment Activities	Average Utilization %	Never Participated %
Overall Activity Participation	22	3
Support Groups		
Specialty Group Meetings	12	11
AA Meetings	36	41
Social Support		
Family Visits	35	29
Physical Activity		
Gym Attendance	21	47
Yoga Class	13	65
Artistic Instruction		
Art Class	12	62

Note. Utilization proportion was calculated by dividing the total number of times a client participated in an activity by the total number of times the activity was available. The middle column shows the group means for utilization. The right column shows the overall percentage of clients who had the opportunity but never participated in an activity during treatment.

Figure 1

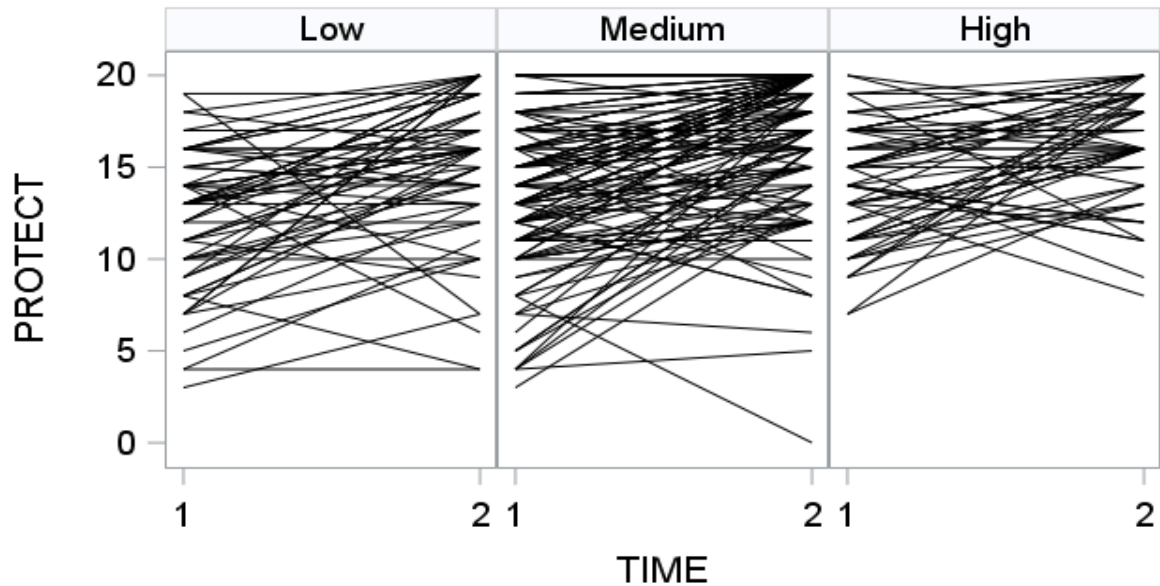
Changes in risk factors (risk) among individuals with low, medium, and high levels of activity participation



Note. Activity participation was categorized based on the quantiles in the distribution of the activity proportion variable. The low group was created from the lowest 25% ($< .125$), the medium group was created from the middle 50% (.125-.286), and the high group was created from the highest 25% ($> .286$). Time 1 represents risk scores at treatment intake and time 2 represents risk scores at discharge. Each line represents an individual participant's data.

Figure 2

Changes in protective factors (protect) among individuals with low, medium, and high levels of activity participation



Note. Activity participation was categorized based on the quantiles in the distribution of the activity proportion variable. The low group was created from the lowest 25% ($< .125$), the medium group was created from the middle 50% (.125-.286), and the high group was created from the highest 25% ($> .286$). Time 1 represents protection scores at treatment intake and time 2 represents protection scores at discharge. Each line represents an individual participant's data.

Table 5***Overall Utilization on Individual BAM Items Across Treatment***

BAM Risk Items	F Value
Substance Use Cravings	.08
Physical Health	3.75*
Trouble Sleeping	3.54*
Negative Mood	2.04
Risky Situations	.85
Social Conflict	.27
BAM Protection Items	
Abstinence/Self-Efficacy	.57
Self-Help Meetings	.55
Spiritual Support	.46
Work & School	.08
Adequate Income	2.83
Social Contact	.53

*Indicates trending significance

Note. Repeated measures GLM for overall utilization on each BAM item. df

for all analyses was (1, 251).

Overall Utilization

Risk. A repeated measures general linear model (GLM) was run using SAS 9.4 (SAS Institute, Cary, NC). There was a significant main effect of time from the beginning to the end of treatment on risk factors for substance use, $F(1, 251) = 110.65, p < .0001$. There was a significant interaction effect between time and overall utilization in voluntary activities on risk factors for substance use, $F(1, 251) = 4.05, p < .05$. The change in risk factors across treatment differed for varying levels of activity utilization. Figure 1 suggests that there were more individuals with large decreases in risk from treatment intake to discharge in the high utilization group than the medium and low utilization groups. Moreover, the low utilization group included the most individuals with minimal change in risk across treatment.

Protection. There was a significant main effect of time from the beginning to the end of treatment on protective factors, $F(1, 251) = 47.77, p < .0001$. There was no interaction effect between time and overall utilization of voluntary activities on protective factors, $F(1, 251) = 1.57, p = .21$. As shown in Figure 2, there was minimal change in protective factors from intake to discharge across low, medium, and high levels of activity utilization.

Post-Hoc Item Analysis. Reliability was calculated for the risk subscale at intake ($\alpha = .72$) and discharge ($\alpha = .53$) and protection at intake ($\alpha = .42$) and discharge ($\alpha = .46$). A post-hoc analysis was run using a repeated measures GLM of overall activity utilization with each individual BAM item. There were no significant interactions of time with overall activity proportion and each individual BAM item, although health ($p = .054$) and sleep ($p = .06$) were trending toward significance (see Table 5).

Utilization by Activity

Risk. A repeated measures GLM was run for each of the voluntary activities (gym, yoga, art, AA meetings, specialty group meetings, and family visits). AA meetings were the only activity to show a significant interaction with time for risk factors, $F(1, 193) = 4.59, p < .05$.

Protection. There were no interaction effects between time and utilization in each individual voluntary activity for protective factors.

Discussion

Supplementing standard mandatory clinical practices with lifestyle activities such as support groups, family involvement opportunities, physical activities, and artistic instruction, all hold promise for supporting recovery in individuals with SUD. Most current evidence comes from controlled research interventions and randomized clinical trials, which can be subject to self-selection bias. The present study uses a natural research design and captures the nuances of the utilization of voluntary treatment activities that occur in real-world treatment settings. There are three main interpretations of the findings. First, utilization of activities during treatment is more beneficial for reducing risk than increasing protective factors. Second, overall utilization has a greater effect on outcomes than utilization of the individual activities themselves. Third, using data-driven user profiles to match the individual to a treatment plan may be the most efficient way to improve treatment outcomes.

The main finding of this study was that overall activity utilization reduced risk factors, but did not promote protective factors. Mitigating risk for substance use by unlearning behaviors that have become automatic in nature is a difficult process (Lewis,

2018). This effort is typically a main emphasis of the standard clinical practices used in evidence based treatments. This study suggests that engagement in voluntary activities, which are not regimented by researchers or clinicians, supports risk reduction. Further, it suggests that risk and protection exist on two sides of a recovery continuum, and that a reduction in risk factors may serve as a necessary precursor to building protective factors. Treatment settings offer an undisturbed space to learn life without substances; offering activities that enrich quality of life in a supervised, supportive treatment environment may be important in the process in reducing risk factors and supporting long-term recovery.

The treatment setting however, may not promote the acquisition of protective behaviors, which often arise from being employed, attending school, having financial stability, and developing healthy relationships. The controlled environment of an inpatient treatment program may be inherently limited in providing full support in these areas. Although the skills to attain stability in a career, finances, and relationships are taught in treatment, protective factors may be more effectively obtained by applying these skills in real world contexts after treatment. This study only captured change from treatment intake to discharge, which may have excluded effects occurring during the assimilation into society post-treatment. Future studies should employ follow-up methods to address the effect of activity utilization on protective factors beyond the timeframe of inpatient program admission.

Another important finding was that the significant relationship between overall utilization and risk was not found for individual activities, with the exception of mutual help AA-style meetings, which was significantly associated with risk reduction. AA

meetings are more closely intertwined with standard clinical practices for substance use than activities such as gym, yoga, art, family visits, and identity group meetings. Thus, individuals may feel a sense of obligation to attend AA meetings that does not exist for other voluntary activities. Additionally, activities such as exercise, social support, and artistic instruction may have a more holistic approach to improving overall quality of life than AA meetings, which tend to be more addiction-focused, further differentiating this activity from the rest.

The finding that reduced risk was linked to overall utilization but not individual activity utilization supports the idea that treatment is a personal process. There is no single factor that improves treatment outcomes across all substance using individuals. Current thinking in the field considers the best approach to be one that personalizes a combination of tools to an individual (Alderman, 2020); activities that are experienced as enjoyable, easily available, and suitable for the individual's lifestyle are more likely to be utilized. To appropriately personalize a treatment "toolbox", however, will require assessing which activities work for which specific individual profiles considering personality and lifestyle. Understanding the patterns and profiles of involvement in treatment opportunities could lead to a more advantageous system of screening and matching the individual to a personalized intervention.

The notion of offering a menu of opportunities within the treatment setting has many advantages, but could also result in an overwhelming amount of choices for a person new to recovery. We are currently witnessing the effects of such overload and dissociation in our current world. Technology is fast-evolving, offering and prompting us to make more choices than we are able to process. Our decision making preferences are

inherently simple; we would rather forgo making a complex decision than to consider all the options at our disposal (Schwartz, 2005). Thus, it may be stressful for substance using populations if too many treatment activity options are presented. Additionally, a greater amount of options presents more opportunities for failure and thus undermine the very goal of improving positive outcomes. Creating an individualized matching system could reduce the burden of choice, relieving the pressure to succeed and boosting engagement.

In the end, the overall goal of offering opportunities to participate in a variety of activities is to improve quality of life in those seeking recovery from addiction. The current study supports the idea that offering a variety of opportunities will allow treatment programs to place a greater emphasis on the individual. Future research may benefit from moving past a focus on traditional addiction outcomes, such as alcohol and drug use, in isolation that do not capture the full spectrum of recovery success. Bates, Price, & Buckman, 2020 recently theorized an individual's mental and physical capacity, strengthened with holistic lifestyle treatment tools, is the true measure of success in achieving recovery goals. They report that previous research has established the effectiveness of treatment tools in substance using populations. However, they note that these tools do not work for every individual. Personalizing treatment may make better use of these tools and will foster improvement in overall quality of life.

Limitations

Treatment Outcomes

Low Reliability. The program evaluation preceding this secondary data analysis yielded a recommendation for using the World Health Organization's Quality of Life instrument, a more holistic outcome measure. The treatment center chose to implement

the BAM survey, a clinical tool widely used by the Veteran's Administration. Although the risk and protection subscales of the BAM survey have shown reliability in previous studies, the current sample did not replicate this reliability on the protection subscale. The protection composite variable exhibited alpha levels below 0.6 and the items were not significantly correlated with each other. It is possible that reliability was due to differences in demographics or other unique features of this treatment sample, but this could not be tested due to a lack of data available from the treatment facility. This low reliability, however, validates the decision to remove AA meetings from the composite score due to confounds with the independent variable.

Limited Measures. The only outcomes collected in the study were risk and protective factors. There are many other indicators of successful addiction treatment such as decreases in mental health symptoms, increases in overall well-being, and maintenance of abstinence that were not collected as part of the previous program evaluation, and are therefore missing from the current study. Future studies should include these more nuanced and complete treatment outcome variables.

Activity Involvement

This study specifically sought to determine the effects of the utilization of treatment activities by the clients; that is, how often clients capitalized on the opportunities offered to them. In this framework, the frequency of utilization proportion is sufficient. However, this does not allow for the understanding of nuances within the activities such as whether each family visit was a positive or negative experience, whether the workout at the gym was strength based or cardio heavy, or the duration or

type of yoga practice. These factors could contribute to the amount of benefit an individual gains from participating.

Clinical Understanding

The data collected were limited in that only changes during this specific residential inpatient program were reflected. No information about previous treatment was provided. Exposure to other forms of treatment or number of intakes could be a confounding variable contributing to the change across treatment. It is well-established that individuals often require multiple treatment attempts before stable recovery is achieved (Kelly, Hoepfner, Urbanoski, & Slaymaker, 2011).

Demographic Variables

The lack of demographic variables in the study limits the understanding of this sample as a whole. There could be differences based on sex, ethnicity, race, social economic status, and other individual factors that may have helped to interpret the effects observed in the analysis. Without this information, it is difficult to generalize these results or contribute to future efforts to better personalize addiction treatment.

Conclusion

Even in light of these limitations, this study contributes to an important understanding of treatment utilization of optional activities, as much of the research in this area has focused on structured, monitored participation. The findings illustrate the importance of being involved in treatment, and suggest that engaging in the treatment process as a whole may hold greater influence on reducing risk than any single activity. These results encourage a line of research focused on individual engagement in holistic

lifestyle activities. Improving quality of life by matching support for recovery may be the most effective direction for future intervention research.

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