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Interpersonal Styles, Peer Relationships, and Outcomes in Residential Substance Use Treatment

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Abstract

Interpersonal relationships play a key role in recovery from substance use disorders (SUDs). We examined the associations between problematic interpersonal styles, peer relationships, and treatment outcomes in a sample of U.S. military veterans in residential SUD treatment. Participants were 189 veterans enrolled in a residential SUD treatment program at a Department of Veterans Affairs medical center. Participants were interviewed at the time of treatment entry (baseline), one month into treatment, and 12 months following discharge from treatment. More problematic interpersonal styles at treatment entry, measured by the Inventory of Interpersonal Problems-Circumplex (IIP-C), predicted more SUD symptoms 12 months post-discharge ($r=.29$, $P<.01$). Results of a principal components analysis of the IIP-C subscales revealed three main factors of interpersonal styles: Passive, Cruel/Aloof, and Controlling. With the exception of the Passive factor, the relationship between these interpersonal styles and SUD symptoms 12 months after discharge was mediated by relationship quality with peers one month in treatment: i.e., more problematic interpersonal styles at baseline predicted poorer relationship quality with peers at 1 month, which in turn predicted more SUD symptoms at 12 months. Results demonstrate the importance of assessing interpersonal styles among patients in residential SUD treatment, as well as potentially augmenting existing evidence-based psychosocial treatments with a focus on interpersonal styles.

Keywords

Interpersonal styles; interpersonal problems; residential treatment; substance use disorders; social support; mediation

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1. Introduction

Substance use disorders (SUDs) are highly prevalent in veteran populations. Among U.S. veterans of the conflicts in Iraq and Afghanistan, for example, approximately 1 in 10 have been diagnosed with an SUD (Seal et al., 2011). Social and interpersonal factors play a key role in the onset and course of SUDs (Galea, Nandi, & Vlahov, 2004; Mccrady, 2004; Moos, 2007). Among veterans, limited social support is associated with hazardous drinking (Scott et al., 2013). Social factors are also associated with the development of mental health problems closely linked with SUDs among veterans, such as posttraumatic stress disorder and depression (Petrakis, Rosenheck, & Desai, 2011; Smith, Benight, & Cieslak, 2013). Although prior research demonstrates the critical role of social support in SUDs, few studies examine *how* interpersonal functioning may lead to better or worse outcomes. The current study sought to elucidate the effect of interpersonal styles on SUD outcomes among veterans in residential treatment.

1.1 Interpersonal Relationships and SUDs

Interpersonal relationships play an important role in the development and course of SUDs (Galea et al., 2004). SUDs often develop in the context of poor relationships with family (Bahr, Marcos, & Maughan, 1995; Galea et al., 2004; Stone, Becker, Huber, & Catalano, 2012) as well as associations with substance-using peers. Moreover, interpersonal stress may precipitate relapse (Leach & Kranzler, 2013). Interpersonal relationships are also a primary component of successful SUD interventions (Moos, 2007). For example, the development of a strong social support network has been identified as a mechanism of change for participants involved in mutual-help groups such as Alcoholics Anonymous (AA; Groh, Jason, & Keys, 2008). Social support also leads to better outcomes in formal SUD treatment (Kidorf et al., 2005; Knight, Wallace, Joe, & Logan, 2001). Further, social support networks consisting of sober friends and family are a robust predictor of sustained abstinence (Litt, Kadden, Tennen, & Kabela-Cormier, 2016; Stout, Kelly, Magill, & Pagano, 2012).

Developing relationships with peers in treatment is an effective way to enhance social support networks. For example, new social contacts made during recovery are more likely to be “clean and sober” than non-treatment-seeking friends (Knight et al., 2001), and the number of people in a person's social network who oppose drinking is associated with more days abstinent and fewer heavy drinking days four months after the end of treatment (Longabaugh, Wirtz, Zywiak, & O'Malley, 2010). Social support networks formed in mutual-help groups, such as AA (Humphreys, Moos, & Finney, 1996; Kaskutas, Bond, & Humphreys, 2002), as well as those formed in formal treatment programs (Knight et al., 2001) are also related to better SUD outcomes.

1.2 Interpersonal styles

What factors influence the development of social support with peers in treatment? One factor may be problematic interpersonal styles, or difficulties relating to others effectively. The interpersonal circumplex is a well-studied framework to examine such problems. As described by Wiggins (1979), the interpersonal circumplex hypothesizes that problematic interpersonal styles (which the authors call “interpersonal problems”) lay on a circular

continuum (see Figure 1). This continuum is bisected by two orthogonal lines representing underlying dimensions of personality: a vertical line representing Dominance, and a horizontal line representing Affiliation. Different types of interpersonal styles can be thought of as a specific “blend” of either Dominance or Affiliation. The Inventory of Interpersonal Problems—Circumplex version (IIP-C) was developed and later validated to assess interpersonal characteristics and behaviors (Alden, Wiggins, & Pincus, 1990; Horowitz, Rosenberg, Baer, Ureño, & Villaseñor, 1988).

The IIP-C has been used to describe interpersonal styles in a variety of clinical populations (Barrett & Barber, 2007; Borkovec, Newman, Pincus, & Lytle, 2002; Hartmann, Zeeck, & Barrett, 2010; Maling, Gurtman, & Howard, 1995; Newman, Jacobson, Erickson, & Fisher, 2017; Vanheule, Desmet, Reitske, & Bogaerts, 2007). Despite its relevance, to our knowledge only one study has examined interpersonal styles among people diagnosed with SUDs (Matano & Locke, 1995), and it did not examine how interpersonal styles may relate to outcomes. This omission is critical given the well-established connections between interpersonal functioning and SUDs.

1.4 The current study

We are not aware of other studies examining interpersonal functioning using the interpersonal circumplex within a U.S. veteran population. Prior studies investigating interpersonal styles among veterans either have not used the circumplex model (e.g., Roberts et al., 1982) or have studied interpersonal styles among veterans in other countries (e.g., MacDonald, Chamberlain, Long, & Flett, 1999). Because social support is a key component in successful SUD treatment, it is important to examine factors which may inhibit the development of strong interpersonal relationships among veterans.

The current study addressed the limitations in the literature by assessing interpersonal styles among a sample of U.S. veterans in residential SUD treatment. Treatment in a residential setting is ideal for examining interpersonal styles among people with SUDs. While in residential treatment, peers interact with one another for most of the day, nearly every day. Residents have contact with peers in both formal treatment activities as well as informal social and recreational activities. Therefore, in residential treatment settings there are many opportunities for both the development of close relationships as well as the emergence and identification of problematic interpersonal styles among patients.

We examined three research questions: 1) Which interpersonal styles do veterans in residential SUD treatment exhibit? 2) Do interpersonal styles at the beginning of residential SUD treatment predict long-term SUD outcomes after discharge? 3) If so, does the quality of relationships with peers in treatment mediate this association? We hypothesized that interpersonal styles would predict poor outcomes after discharge, such that more problematic interpersonal styles at the outset of treatment would predict a greater number of SUD symptoms assessed 12 months after discharge from treatment. We also hypothesized that the relationship between interpersonal styles and SUD symptoms would be mediated by poor relationship quality with peers in residential treatment.

2. Materials and Methods

2.1 Sample and Procedures

Participants were military veterans enrolled in residential SUD treatment at a Veterans Affairs (VA) medical center. Veterans were involved in treatment approximately 7 hours per day, 5 days per week in both individual and group-based activities. Treatment interventions were abstinence-based and took a combined Cognitive Behavioral Therapy and Twelve-Step Facilitation approach.

Upon entry into residential treatment, residents were invited to participate in a research study on personality and substance use through program announcements and fliers. Research assistants contacted patients who expressed interest and scheduled an in-person baseline assessment (n=200). In the current study, we included only participants who reported drug and/or alcohol use and endorsed at least one SUD symptom in the 12 months prior to treatment entry (n=189). Of the 189 veterans in the sample, 96.2% were male, and 46.0% identified as non-Hispanic white, 30.7% as African American, 12.7% as Hispanic or Latino/a, 4.2% as Asian, 1.6% as Native American, and 4.8% as another race/ethnicity. Participants had a mean age of 49.9 years (range: 25-77 years). Based on the Structured Clinical Interview for Axis I disorders (SCID-I; First, M. B., Spitzer, R.L, Gibbon M., and Williams, 2002) administered by research personnel, 73.5% of the sample met criteria for an alcohol use disorder and 67% of the sample met criteria for a drug use disorder in the 12 months prior to treatment entry. Participants who had used drugs identified cocaine (N=52), methamphetamines (N=37), marijuana (N=33), heroin/opiates (N=24), and benzodiazepines (N=1) as the most problematic substances. Participants had received a high degree of treatment for SUD prior to the current residential admission: 54.5% of the sample had previously received inpatient alcohol or drug detoxification, 61.3% had previously received outpatient SUD treatment, and 27.5% of the sample had previously attended residential SUD treatment at the same facility.

The baseline assessment involved semi-structured interviews and self-report questionnaires measuring personality and related constructs (e.g., interpersonal problems). One month into treatment, research assistants administered a follow-up assessment comprised of self-report questionnaires to assess various treatment processes (e.g., quality of their relationship with other residents) (n=160, 84.7% retention rate). Patients stayed in treatment for an average of 110 days (SD=64.2). Twelve months following discharge from the program, participants completed a follow-up interview (n=142; 76.8%, excluding 6 participants who died) via telephone, measuring personality, psychosocial functioning, and substance use outcomes since discharge. Attrition analyses conducted separately at the 1-month and 12-month follow-up assessments revealed no significant differences between responders and non-responders at these time points on their level of interpersonal problems at baseline, SUD symptoms at baseline, or relationship quality with peers in treatment at the 1-month follow-up. The study was approved by the local institutional review board.

2.2 Measures

2.2.1 SUD Symptom Count—We used the SCID-I at the baseline and 12-month follow-up interviews to collect information regarding participants' SUD symptoms—i.e., DSM-IV diagnostic symptoms for abuse and dependence of alcohol and drugs. This approach is consistent with the DSM-5's dimensional approach to SUD diagnosis and severity. SUD symptoms are also widely known and routinely used by clinicians, which increases interpretability of results. Items assessing for symptoms of alcohol use disorder included, “In the past 12 months, did you get in trouble with the law because of drinking?” and “In the past 12 months, did you spend a lot of time drinking, being drunk or hung-over, or thinking about your next drink?” These items were modified to assess for symptoms of drug use disorder for the drug identified as primary by the participant, e.g. “In the past 12 months, did you get in trouble with the law because of cocaine use?” To calculate the total number of SUD symptoms, we added the number of symptoms for alcohol and for drug use. At baseline, participants endorsed a range of 1 to 21 symptoms out of a possible 22 symptoms (median=10, mean=10.5, standard deviation=4.4).

2.2.2 Interpersonal Styles—At the baseline interview, we used the 64-item circumplex version of the Inventory of Interpersonal Problems (IIP-C) to characterize problematic interpersonal styles (Alden et al., 1990). For each item on the IIP-C, participants were asked to report on the extent to which social behaviors are difficult and the extent to which participants engage in behaviors too frequently. It is comprised of eight subscales corresponding with the types of interpersonal styles described in Figure 1: Domineering (too aggressive, e.g. “I argue with other people too much”), Intrusive (seeking attention inappropriately, e.g. “I want to be noticed too much”), Overly Nurturant (too eager to please others, e.g. “I try to please other people too much”), Exploitable (too trusting and permissive, e.g. “I find it difficult to say ‘no’ to other people”), Nonassertive (failing to be forceful, e.g. “I find it difficult to tell a person to stop bothering me”), Socially Avoidant (socially anxious and shy, e.g. “I find it difficult to join in on groups”), Cold (trouble with affection and sympathy, e.g. “I find it difficult to show affection to people”), and Vindictive (suspicious and distrustful, e.g. “I find it difficult to really care about other people's problems”). Each subscale has eight items rated on a 5-point Likert scale (values ranged from 0 [“Not at all”] to 4 [“Extremely”]), which were summed to create a score for each subscale. Consistent with the circumplex scoring method (Gurtman, 1996), we standardized scores according to norms provided by Horowitz, Alden, Wiggins and Pincus (2000). Their normative sample was comprised of 800 adults from the U.S. aged 18-89 stratified by gender, age, race/ethnicity and education level, according to population estimates from the U.S. Bureau of the Census. We report standard scores on a T-scale metric with a mean of 50 and standard deviation of 10. Similar to previous studies (Alden et al., 1990), the current study found Cronbach's alphas ranging from .74 to .87 across subscales (see Table 1).

2.2.3 Poor Relationship Quality with Peers in Treatment—Approximately one month into treatment, we asked participants about the quality of their relationships with other residents in the treatment program. Participants completed an adapted version of the Life Stressors and Social Resources Inventory (LISRES) (Blonigen, Timko, Finney, Moos, & Moos, 2011; Moos, Fenn, Billings, & Moos, 1988), which was designed to measure

resources and stressors across several life domains. We used the Stressors subscale to measure poor relationship quality of the participant with peers in treatment. The five items on the Stressors subscale include, “Are other residents critical or disapproving of you?” and “Do any of the other residents get angry or lose their temper with you?” Participants rated the items on a 5-point Likert scale with values ranging from 1 (never) to 5 (often).

2.3 Analytical Plan

Table 1 presents descriptive statistics for all study variables. To establish unadjusted relationships, we computed zero-order correlations among the study variables (Table 2). Because the subscales of the IIP-C were highly related to one another, we used principal components analysis (PCA) to reduce redundancy when examining mechanisms that may explain associations between interpersonal problems and SUD symptom count.

To answer our remaining research questions, we followed the approach to mediational analysis proposed by Hayes (2013). This approach allowed us to test whether interpersonal styles predicted SUD outcomes (direct effect) and whether the relationship quality with peers in treatment mediated this relationship (indirect effect). We tested models for total interpersonal problems (total score of the IIP-C) as well as each factor identified through the PCA. Mediation analyses were conducted using the PROCESS macro for SPSS developed by Andrew Hayes (Hayes, 2012). Bias-corrected bootstrapped confidence intervals of the indirect effect were calculated based on 5,000 iterations. Mediation would be supported if the bias-corrected confidence intervals of the indirect effect did not include 0. We controlled for scores on the outcome variable (SUD symptom count) at baseline and length of stay in the treatment program in our analyses.

3. Results

3.1 Interpersonal Styles, Poor Relationship Quality with Treatment Peers, and SUD Symptom Count

Table 1 shows descriptive statistics for variables measuring interpersonal problems (scores on the IIP-C), poor relationship quality with peers in treatment (LISRES-Stressors scores), and SUD symptom count at the baseline interview and at the 12-month follow-up. SUD symptom count decreased significantly from the baseline interview to the 12-month follow-up ($t=12.03$; $P<.0001$).

Veterans in treatment reported more interpersonal problems than the normative sample: they had a mean total standardized score of 60.2 on the IIP-C, which ranks in the 84th percentile. Veterans also scored higher on all individual domains of interpersonal problems measured by the eight subscales of the IIP-C: in the 84th percentile on the Socially Avoidant subscale, 81st percentile on the Overly Nurturant subscale, 82nd percentile on the Domineering, Vindictive, and Cold subscales, 76th percentile on the Exploitable subscale, 75th percentile on the Intrusive subscale, and 73rd percentile on the Nonassertive subscale.

3.2 Intercorrelations among Study Variables

Table 2 shows zero-order correlations among the study variables. Notably, the magnitude of the correlation between SUD symptom count at baseline and SUD symptom count 12 months after discharge ($r=.31$, $P<.01$) was comparable to the magnitude of the correlation between the IIP Total Score at baseline and SUD symptom count 12 months after discharge ($r=.29$, $P<.01$).

Subscales of the IIP-C were positively associated with each other (Table 2), particularly subscales close in proximity on the circumplex (e.g., Overly Nurturant and Exploitable; see Figure 1). In terms of prospective relationships, IIP-C subscales reflecting high dominance (e.g., Domineering, Intrusive) and low affiliation (e.g., Vindictive, Cold, Socially Avoidant) predicted poor relationship quality with peers one month into treatment as well as a higher SUD symptom count at the 12-month follow-up. Poor relationship quality with peers one month into treatment also predicted more symptoms of SUDs at the 12-month follow-up.

3.3 Principal Components Analysis (PCA)

As described above, we conducted a PCA to reduce redundancy in the IIP-C scale scores when examining mediation models. Data were excluded listwise ($N=174$). The Kaiser-Meyer-Olin measure of sampling adequacy and Bartlett's Test of Sphericity indicated the data did not violate assumptions required to conduct PCA. Using a varimax rotation, we found three factors, which accounted for 85.8% of the variance in the IIP-C scales scores (Table 3). The Nonassertive, Exploitable, and Overly Nurturant subscales loaded onto the first factor, which we named, "Passive" (Cronbach's $\alpha=.92$). The second factor, titled, "Cruel/Aloof," included the Vindictive, Cold, and Socially Avoidant subscales (Cronbach's $\alpha=0.92$). The Domineering and Intrusive subscales loaded onto the final factor, which we named, "Controlling" (Cronbach's $\alpha=0.83$).

3.4 Testing Poor Relationship Quality with Peers in Treatment as a Mediator Between Interpersonal Styles and SUD Symptoms

We examined mediation models testing the extent to which poor relationship quality with peers one month into treatment mediated the relationship between interpersonal styles at intake and SUD symptoms 12 months after discharge (see Figure 2). We tested direct effects of interpersonal styles on SUD symptom count at follow-up, and then examined the indirect effects of interpersonal styles on SUD symptom count at follow-up through poor relationship quality with peers in treatment. We tested the associations between the IIP-C total score as well as the three factors emerging from the PCA separately. In all models, we controlled for scores on the outcome variable (SUD symptom count) at baseline and length of stay in the treatment program. Data were excluded listwise. The direct effects of each of the paths in each of the models are shown in Panels A – D in Figure 2.¹ In the text below, we highlight the results of the overall F test and the percent of variance explained by the each model (i.e., R^2) as well as the direct and indirect effects of the IIP-C score on the outcome.

¹Additional details of the direct effects of the covariates on the 12-month outcome for each model are available by request from the first author.

For the sake of parsimony, all other direct effects in the models are presented only in the figure.

3.4.1 IIP-C Total Score—The model for the IIP-C total score, shown in Figure 2, panel A ($n=122$) was significant ($R^2=0.203$; $F(1,120)=7.459$, $p<0.000$) with a large effect size in terms of percent variance explained by the model (see Cohen, 1988). The direct effect of interpersonal styles on SUD Symptom Count at the 12-month follow-up was significant ($B=0.029$, $SE=0.012$, $p=0.015$), such that more interpersonal problems predicted a greater number of SUD symptoms. The indirect effect was also significant ($B=0.009$, $SE=.004$, 95% bias-corrected confidence interval [CI]=0.002, 0.019), such that that more interpersonal problems at baseline led to more SUD symptoms at the 12-month follow-up via poor relationships with peers in treatment.

3.4.2 Passive factor—The model for the Passive factor was also significant (Figure 2, panel B, $n=114$; $R^2=0.195$, $F(4,109)=6.584$, $p<0.000$) and had a large effect size. The direct effect of the Passive factor on SUD symptom count was significant ($B=0.947$, $SE=0.410$, $p=0.023$), such that more a passive interpersonal style predicted a greater number of SUD symptoms. However, we did not find evidence of mediation: i.e., passive interpersonal style was not associated with poor relationship quality with peers, and the indirect effect of this model was not significant.

3.4.3 Cruel/Aloof factor—The model for the Cruel/Aloof factor was significant (Figure 2, panel C, $n=114$; $R^2=0.157$; $F(4,109)=5.088$, $p>0.001$) and had a large effect size. Although the direct effect of scores on the Cruel/Aloof factor on SUD Symptom Count at the 12-month follow-up was not significant ($B=0.233$, $SE=0.431$, $p=0.590$), the indirect effect was significant ($B=0.328$; $SE=0.149$, 95% CI=0.096, 0.686). Thus, a cruel/aloof interpersonal style led to more symptoms of SUDs at the 12-month follow-up, and this relationship was mediated by poor relationships with peers in treatment.

3.4.4 Controlling factor—The final model was also significant (Figure 2, panel C, $n=114$; $R^2=0.176$, $F(4,109)=5.838$, $p>0.001$) with a large effect size. The direct effect of the Controlling factor on SUD Symptom Count was not significant ($B=0.701$, $SE=0.417$, $p=0.096$). However, the indirect effect of the Controlling factor on SUD Symptom Count was significant ($B=0.367$, $SE=0.184$, 95% CI=0.088, 0.818), such that a more controlling interpersonal style led to more SUD symptoms one year after discharge via poor relationships with peers in treatment.

4. Discussion

To our knowledge, this is the first study to examine the role of interpersonal styles on SUD treatment outcomes among U.S. veterans in residential treatment. We found that veterans in residential treatment reported more total interpersonal problems than the general population by a magnitude of one standard deviation. The most common types of problematic interpersonal styles exhibited by veterans were those associated with low levels of affiliation: Domineering, Vindictive, Cold, and Socially Avoidant. Moreover, we found that interpersonal styles were associated with long-term SUD outcomes, such that higher levels

of interpersonal problems predicted a greater number of SUD symptoms one year after treatment. In previous research, substance use at the time of treatment entry is typically a robust predictor of outcome (Crowley, Mikulich, MacDonald, Young, & Zerbe, 1998; Read, Brown, & Kahler, 2004). Our results suggest that interpersonal styles may be an equally good predictor of treatment outcome. Even when controlling for SUD severity at time of entry into the residential treatment program, interpersonal styles play an important role in predicting SUD severity after discharge.

The relationship between interpersonal styles and treatment outcomes was mediated by relationship quality with peers in treatment. These results corroborate prior research demonstrating that social context is an important aspect of SUDs (Galea et al., 2004; Leach & Kranzler, 2013). Previous work has focused primarily on the role of social support networks and peer influences on treatment outcomes in mutual-help groups (Groh et al., 2008). Our findings extend this literature by demonstrating that interpersonal styles negatively affect the formation of social support networks during residential treatment, and in turn influence outcomes. Residential settings, as opposed to outpatient settings, are an ideal location to examine the associations between social variables and outcomes. Residents in inpatient programs have both positive and negative interactions with one another at many points throughout the each day, and peer relationships are a central aspect of treatment. Accordingly, interpersonal styles may have a greater impact in residential settings than in outpatient treatment.

Specific types of interpersonal styles were differentially associated with treatment outcomes. The relationship between both the Controlling and Cruel/Aloof interpersonal styles and SUD outcomes were mediated by poor relationship quality with peers in treatment. Participants high in the Controlling factor of interpersonal problems may have difficulty forming and maintaining relationships with peers in the treatment setting. The Controlling factor is comprised of the Domineering and Intrusive subscales of the IIP-C, which are both high in dominance and characterized by attempts to control others or seek attention inappropriately. These externalizing behaviors may cause conflicts with other residents, and thus impair peer relationships. A similar process may have occurred with participants high in the Cruel/Aloof factor, which includes the Vindictive, Cold, and Socially Avoidant subscales. Notably, although the indirect effects were significant for both the Controlling and Cruel/Aloof factors, the direct effects of these factors on SUD outcomes were not significant: the Controlling and Cruel/Aloof factors influence outcomes *only* via poor relationships with peers. For those with Controlling and Cruel/Aloof interpersonal styles, lack of social support may reduce the efficacy of treatment. Although we did not find evidence for mediation for the Passive factor, high scores nevertheless predicted poor SUD outcomes. The Passive factor is comprised of subscales (Nonassertive, Exploitable, and Overly Nurturant) which are low in dominance and associated with social anxiety (Kachin, Newman, & Pincus, 2001). Residents with a Passive interpersonal style therefore may be less disruptive to the milieu and cause fewer explicit disagreements with other residents. In a setting characterized by high rates of conflict, providers may not recognize internalized distress experienced by residents with a Passive interpersonal style. These unaddressed problems may lead to poor long-term SUD outcomes.

4.1 Limitations

This study had several limitations. First, these data are self-report. Our findings reflect the individual's understanding of his or her own interpersonal styles. However, insight into one's own relationships may be limited, and peers' perceptions therefore may be equally important. In addition, because the majority of participants were men, we could not examine gender differences. Relationships and social context differ between men and women with problematic substance use (Timko, Finney, & Moos, 2005), and so it will be important for future studies of interpersonal styles and outcomes in the context of SUD treatment to include more women. In addition, diagnostic data on other psychiatric disorders (e.g., mood and anxiety disorders) were not collected on participants; thus, we could not examine the role of interpersonal processes on treatment outcomes in the context of specific comorbid psychiatric conditions.

Our results also may not be generalizable to non-veteran populations. Military recruits have lower levels of "agreeableness," a personality trait associated with a desire for social harmony, when they join the armed forces (Jackson, Thoemmes, Jonkmann, Ludtke, & Trautwein, 2012). These already-low levels decrease further after military training (Jackson et al., 2012). Low agreeableness would be consistent with Vindictive, Cold, or Socially Avoidant types of interpersonal problems. Social support may therefore function differently for populations higher in agreeableness, who may exhibit different interpersonal styles.

4.2 Implications for Treatment and Future Directions for Research

Despite these limitations, our results have several implications for improving treatment and conducting future research. First, providers may wish to routinely assess interpersonal styles of patients in residential SUD treatment. For milieu-based programs, integrating measures of interpersonal styles would help to both tailor treatment to the individual and to anticipate potential disturbances within the milieu setting. For example, those with a Passive interpersonal style may benefit from providers increasing their awareness of internalized distress that may otherwise go unnoticed. Prioritizing interpersonal styles may also increase the cost-effectiveness of treatment. Residential milieu-based treatment programs are typically expensive (Kaskutas, Zavala, Parthasarathy, & Witbrodt, 2008), and improving outcomes by focusing on problematic interpersonal styles may reduce readmissions and lead to better quality of life for clients.

Our findings suggest it may be helpful to augment and adapt existing outpatient psychosocial treatments to include a focus on interpersonal styles. For example, Network Support (NS) treatment (Litt et al., 2016) reduces problematic alcohol use by helping clients to shift their social support networks to include sober individuals and exclude substance using contacts. Litt and colleagues (2016) found that enhancing NS with social skills training, which taught participants how to meet and interact with new acquaintances, assisted in positively changing social support networks. Therefore, including additional material addressing a broader range of social issues, especially problematic interpersonal styles, may further improve efficacy. Alternatively, clinicians may benefit from adapting empirically supported treatments which already include a focus on interpersonal styles. For example, both Dialectical Behavior Therapy (DBT) and Skills Training in Affective and

Interpersonal Regulation (STAIR) are widely disseminated therapies that treat Borderline Personality Disorder and trauma symptoms, respectively. Both treatments include modules that teach clients better understand interpersonal problems in their own lives and learn to respond to others in more effective ways. Adapting these therapies to focus on the needs and experiences of people with primary diagnoses of SUDs is an important next step.

5. Conclusions

In a sample of veteran patients in residential SUD treatment, problematic interpersonal styles predicted poorer SUD symptom outcomes, as did having more SUD symptoms at the time of treatment entry. In a lagged mediation analysis, the relationship between interpersonal styles and SUD outcomes was mediated by poor relationship quality with peers in treatment. Results support the utility of assessing interpersonal problems among people with SUDs and addressing these problems in residential treatment. Future research should examine whether augmenting already-developed psychosocial treatments to address interpersonal problems would enhance treatment.

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References

- Alden LE, Wiggins JS, Pincus AL. Construction of circumplex scales for the Inventory of Interpersonal Problems. *Journal of Personality Assessment*. 1990; 55(3-4):521–536. https://doi.org/10.1207/s15327752jpa5503&4_10. [PubMed: 2280321]
- Bahr SJ, Marcos AC, Maughan SL. Family, Educational and Peer Influences on the Alcohol-Use of Female and Male-Adolescents. *Journal of Studies on Alcohol*. 1995; 56(4):457–469. [PubMed: 7674682]
- Barrett MS, Barber JP. Interpersonal profiles in major depressive disorder. *Journal of Clinical Psychology*. 2007; 63(3):247–266. <https://doi.org/10.1002/jclp>. [PubMed: 17211875]
- Blonigen DM, Timko C, Finney JW, Moos BS, Moos RH. Alcoholics Anonymous attendance, decreases in impulsivity and drinking and psychosocial outcomes over 16 years: Moderated-mediation from a developmental perspective. *Addiction*. 2011; 106(12):2167–2177. <https://doi.org/10.1111/j.1360-0443.2011.03522.x>. [PubMed: 21631626]
- Borkovec TD, Newman MG, Pincus AL, Lytle R. A component analysis of cognitive-behavioral therapy for generalized anxiety disorder and the role of interpersonal problems. *Journal of Consulting and Clinical Psychology*. 2002; 70(2):288–298. <https://doi.org/10.1037/0022-006X.70.2.288>. [PubMed: 11952187]
- Crowley TJ, Mikulich SK, MacDonald M, Young SE, Zerbe GO. Substance-dependent, conduct-disordered adolescent males: severity of diagnosis predicts 2-year outcome. *Drug and Alcohol Dependence*. 1998; 49(3):225–237. [https://doi.org/10.1016/S0376-8716\(98\)00016-7](https://doi.org/10.1016/S0376-8716(98)00016-7). [PubMed: 9571387]
- First, MB., Spitzer, RL., Gibbon, M., Williams, JB. Structured Clinical Interview for DSM-IV-TR Axis I Disorders. New York State Psychiatric Institute; 2002. Retrieved from http://www.scid4.org/revisions/november_2001_02.htm

- Galea S, Nandi A, Vlahov D. The social epidemiology of substance use. *Epidemiologic Reviews*. 2004; 26:36–52. <https://doi.org/10.1093/epirev/mxh007>. [PubMed: 15234946]
- Groh DR, Jason LA, Keys CB. Social network variables in alcoholics anonymous: A literature review. *Clinical Psychology Review*. 2008; 28(3):430–450. <https://doi.org/10.1016/j.cpr.2007.07.014>. [PubMed: 17719158]
- Gurtman MB. Interpersonal problems and the psychotherapy context: The construct validity of the Inventory of Interpersonal Problems. *Psychological Assessment*. 1996; 8(3):241–255. <https://doi.org/10.1037/1040-3590.8.3.241>.
- Hartmann A, Zeeck A, Barrett MS. Interpersonal problems in eating disorders. *International Journal of Eating Disorders*. 2010; 43(7):619–627. <https://doi.org/10.1002/eat.20747>. [PubMed: 19718674]
- Hayes, AF. PROCESS: A Versatile Computational Tool for Observed Variable Mediation, Moderation, and Conditional Process Modeling. 2012. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
- Hayes, AF. Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach. Kenny, DA., Little, TD., editors. New York, NY: The Guilford Press; 2013.
- Horowitz, LM., Alden, LE., Wiggins, JS., Pincus, AL. Manual for the inventory of interpersonal problems. San Antonio, TX: Psychological Corporation; 2000.
- Horowitz LM, Rosenberg SE, Baer BA, Ureño G, Villaseñor VS. Inventory of interpersonal problems: Psychometric properties and clinical applications. *Journal of Consulting and Clinical Psychology*. 1988; 56(6):885–892. <https://doi.org/10.1037/0022-006X.56.6.885>. [PubMed: 3204198]
- Humphreys K, Moos RH, Finney JW. Life domains, alcoholics anonymous, and role incumbency in the 3-year course of problem drinking. *The Journal of Nervous and Mental Disease*. 1996; 184(8):475–481. <https://doi.org/10.1097/00005053-199608000-00004>. [PubMed: 8752076]
- Jackson JJ, Thoemmes F, Jonkmann K, Ludtke O, Trautwein U. Military Training and Personality Trait Development: Does the Military Make the Man, or Does the Man Make the Military? *Psychological Science*. 2012; 23(3):270–277. <https://doi.org/10.1177/0956797611423545>. [PubMed: 22275337]
- Kachin KE, Newman MG, Pincus AL. An interpersonal problem approach to the division of social phobia subtypes. *Behavior Therapy*. 2001; 32:479–501. [https://doi.org/10.1016/S0005-7894\(01\)80032-0](https://doi.org/10.1016/S0005-7894(01)80032-0).
- Kaskutas LA, Bond J, Humphreys K. Social networks as mediators of the effect of Alcoholics Anonymous. *Addiction*. 2002; 97(7):891–900. <https://doi.org/10.1046/j.1360-0443.2002.00118.x>. [PubMed: 12133128]
- Kaskutas LA, Zavala SK, Parthasarathy S, Witbrodt J. Costs of day hospital and community residential chemical dependency treatment. *The Journal of Mental Health Policy and Economics*. 2008; 11(1):27–32. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18424874>. [PubMed: 18424874]
- Kidorf M, King VL, Neufeld K, Stoller KB, Peirce J, Brooner RK. Involving significant others in the care of opioid-dependent patients receiving methadone. *Journal of Substance Abuse Treatment*. 2005; 29(1):19–27. <https://doi.org/10.1016/j.jsat.2005.03.006>. [PubMed: 15979528]
- Knight DK, Wallace GL, Joe GW, Logan SM. Change in psychosocial functioning and social relations among women in residential substance abuse treatment. *Journal of Substance Abuse*. 2001; 13(4):533–547. [https://doi.org/10.1016/S0899-3289\(01\)00087-6](https://doi.org/10.1016/S0899-3289(01)00087-6). [PubMed: 11775081]
- Leach D, Kranzler HR. An Interpersonal Model of Addiction Relapse. *Addictive Disorders & Their Treatment*. 2013; 12(4):183–192. <https://doi.org/10.1097/ADT.0b013e31826ac408>. [PubMed: 24489485]
- Litt MD, Kadden RM, Tennen H, Kabela-Cormier E. Network Support II: Randomized controlled trial of Network Support treatment and cognitive behavioral therapy for alcohol use disorder. *Drug and Alcohol Dependence*. 2016; 165:203–212. <https://doi.org/10.1016/j.drugalcdep.2016.06.010>. [PubMed: 27354234]
- Longabaugh R, Wirtz PW, Zywiak WH, O'Malley SS. Network Support as a Prognostic Indicator of Drinking Outcomes : The COMBINE Study. *Journal of Studies on Alcohol and Drugs*. 2010:838–46.

- MacDonald C, Chamberlain K, Long N, Flett R. Posttraumatic stress disorder and interpersonal functioning in Vietnam War veterans: a mediational model. *Journal of Traumatic Stress*. 1999; 12(4):701–707. <https://doi.org/10.1023/A:1024729520686>. [PubMed: 10646188]
- Maling M, Gurtman M, Howard K. The Response of Interpersonal Problems to Varying Doses of Psychotherapy. *Psychotherapy Research*. 1995; 5(1):63–75. <https://doi.org/10.1080/10503309512331331146>.
- Matano, Ra, Locke, KD. Personality Disorder Scales as Predictors of Interpersonal Problems of Alcoholics. *Journal of Personality Disorders*. 1995; 9(1):62–67. <https://doi.org/10.1521/pedi.1995.9.1.62>.
- Mccrady BS. To Have But One True Friend : Implications for Practice of Research on Alcohol Use Disorders and Social Networks. 2004; 18(2):113–121. <https://doi.org/10.1037/0893-164X.18.2.113>.
- Moos RH. Theory-based active ingredients of effective treatments for substance use disorders. *Drug and Alcohol Dependence*. 2007; 88:2–3. 109–121. <https://doi.org/10.1016/j.drugalcdep.2006.10.010>.
- Moos RH, Fenn CB, Billings AG, Moos BS. Assessing life stressors and social resources: Applications to alcoholic patients. *Journal of Substance Abuse*. 1988; 1(2):135–152. [https://doi.org/10.1016/S0899-3289\(88\)80017-8](https://doi.org/10.1016/S0899-3289(88)80017-8). [PubMed: 2980865]
- Newman MG, Jacobson NC, Erickson TM, Fisher AJ. Interpersonal Problems Predict Differential Response to Cognitive Versus Behavioral Treatment in a Randomized Controlled Trial. *Behavior Therapy*. 2017; 48(1):56–68. <https://doi.org/10.1016/j.beth.2016.05.005>. [PubMed: 28077221]
- Petrakis IL, Rosenheck R, Desai R. Substance Use Comorbidity among Veterans with Posttraumatic Stress Disorder and Other Psychiatric Illness. *The American Journal on Addictions*. 2011; 20(3): 185–189. <https://doi.org/10.1111/j.1521-0391.2011.00126.x>. [PubMed: 21477045]
- Read JP, Brown PJ, Kahler CW. Substance use and posttraumatic stress disorders: Symptom interplay and effects on outcome. *Addictive Behaviors*. 2004; 29(8):1665–1672. <https://doi.org/10.1016/j.addbeh.2004.02.061>. [PubMed: 15451135]
- Roberts WR, Penk WE, Gearing ML, Robinowitz R, Dolan MP, Patterson ET. Interpersonal problems of Vietnam combat veterans with symptoms of posttraumatic stress disorder. *Journal of Abnormal Psychology*. 1982; 91(Note 1):444–450. <https://doi.org/10.1037/0021-843X.91.6.444>. [PubMed: 7153418]
- Scott JC, Pietrzak RH, Mattocks K, Southwick SM, Brandt C, Haskell S. Gender differences in the correlates of hazardous drinking among Iraq and Afghanistan veterans. *Drug and Alcohol Dependence*. 2013; 127:1–3. 15–22. <https://doi.org/10.1016/j.drugalcdep.2012.06.003>. [PubMed: 22749680]
- Seal KH, Cohen G, Waldrop A, Cohen BE, Maguen S, Seal KH, Ren L. Substance use disorders in Iraq and Afghanistan veterans in VA healthcare, 2001–2010: Implications for screening, diagnosis and treatment. *Drug and Alcohol Dependence*. 2011; 116:93–101. Retrieved from <http://digitalcommons.unl.edu/publichealthresources>. [PubMed: 21277712]
- Smith AJ, Benight CC, Cieslak R. Social support and postdeployment coping self-efficacy as predictors of distress among combat veterans. *Military Psychology*. 2013; 25(5):452–461. <https://doi.org/10.1037/mil0000013>.
- Stone, AL., Becker, LG., Huber, AM., Catalano, RF. Review of risk and protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors*. 2012 Jul. <https://doi.org/10.1016/j.addbeh.2012.02.014>
- Stout RL, Kelly JF, Magill M, Pagano ME. Association between social influences and drinking outcomes across three years. *Journal of Studies on Alcohol and Drugs*. 2012; 73(3):489–97. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3316719&tool=pmcentrez&rendertype=abstract>. [PubMed: 22456254]
- Timko C, Finney JW, Moos RH. The 8-year course of alcohol abuse: gender differences in social context and coping. *Alcoholism, Clinical and Experimental Research*. 2005; 29(4):612–21. <https://doi.org/10.1097/01.ALC.0000158832.07705.22>.
- Vanheule S, Desmet M, Reitske M, Bogaerts S. Alexithymia and Interpersonal Problems. *Journal of Clinical Psychology*. 2007; 63(1):109–117. <https://doi.org/10.1002/jclp>. [PubMed: 17016830]

Wiggins JS. A psychological taxonomy of trait-descriptive terms: The interpersonal domain. *Journal of Personality and Social Psychology*. 1979; 37(3):395–412. <https://doi.org/10.1037/0022-3514.37.3.395>.

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Highlights

- Veterans in residential SUD treatment tend to exhibit problematic interpersonal styles
- Interpersonal styles predict SUD outcomes
- Poor relationships with peers mediate the association between interpersonal styles and outcomes
- Interpersonal styles are important to consider in SUD assessment and treatment

Figure 1.

Diagram of the interpersonal circumplex. (Adapted from “Construction of Circumplex Scales for the Inventory of Interpersonal Problems” by L. E. Alden, J. S. Wiggins, and A. L. Pincus, 1990, p. 529, *Journal of Personality Assessment*, 55, 521–536. Copyright 1990 by the Society of Personality Assessment.)

(A)

Indirect effect: $B=0.009$, $SE=0.004$, 95% CI=0.002, 0.019

(B)

Indirect effect: $B=0.072$, $SE=0.121$, 95% CI=-0.148, 0.344

Indirect effect: $B=0.328$; $SE=0.149$, 95% CI=0.096, 0.686

Indirect effect: $B=0.367$, $SE=0.184$, 95% CI=0.088, 0.818

Figure 2.

Poor relationship quality with peers in treatment as a mediator of associations between interpersonal problems at baseline (treatment intake) and symptoms of SUD 12 months after treatment discharge. Analyses controlled for length of stay in program and symptoms of SUD at baseline. Values shown are unstandardized (B) coefficients, associated standard errors (SE), and 95% Confidence Intervals (95% CI). **** $p < .001$; *** $p < .005$; ** $p < 0.01$; * $p < 0.05$

Table 1**Descriptive Statistics of Study Variables (N=142-189)**

	N	Mean	(SD)	Min	Max	Cronbach's α
IIP-C (Baseline) ^a						
IIP-C Total Score	189	60.2	(11.4)	33.5	95.9	0.94
Domineering	186	59.4	(13.6)	38.5	99.3	0.78
Vindictive	186	59.6	(12.5)	39.1	107.2	0.79
Cold	184	59.4	(11.5)	40.0	90.0	0.84
Socially Avoidant	184	59.9	(13.6)	37.1	99.6	0.82
Nonassertive	187	55.9	(12.3)	36.8	92.1	0.87
Exploitable	187	56.7	(12.6)	32.7	97.3	0.79
Overly Nurturant	187	58.6	(11.6)	33.5	95.0	0.79
Intrusive	185	56.5	(13.3)	35.9	97.4	0.74
Relationship Quality with Peers (1 month into treatment)	160	7.6	(3.3)	0.0	19.0	0.76
SUD Symptom Count (Baseline)	189	10.5	(5.5)	1.0	21.0	--
SUD Symptom Count (12-months after discharge)	142	3.7	(5.1)	0.0	21.0	--

IIP -C = Inventory of Interpersonal Problems - Circumplex version

SUD = Substance Use Disorder

^aThe IIP-C total score and scale scores are on a T-score metric (M=50, SD=10) and were calculated in reference to the IIP-C scores from the normative sample published by Horowitz, Alden, Wiggins and Pincus (2000).

Table 2
Intercorrelations between interpersonal functioning variables at baseline, resident stress one month into treatment, and alcohol use disorder^J
(n=142-189)

	1	2	3	4	5	6	7	8	9	10	11	12
1. IIP-C Total Score	--											
2. Domineering	0.64**	--										
3. Vindictive	0.62**	0.68**	--									
4. Cold	0.73**	0.53**	0.71**	--								
5. Socially Avoidant	0.80**	0.44**	0.53**	0.71**	--							
6. Nonassertive	0.80**	0.27**	0.26**	0.46**	0.67**	--						
7. Exploitable	0.71**	0.17*	0.06	0.22**	0.46**	0.73**	--					
8. Overly Nurturant	0.62**	0.17*	0.02	0.17*	0.34**	0.53**	0.80**	--				
9. Intrusive	0.64**	0.50**	0.27**	0.21**	0.22**	0.43**	0.55**	0.54**	--			
10. Relationship Quality with Peers (1 month into treatment)	0.34**	0.40**	0.36**	0.23**	0.22**	0.12	0.10	0.16*	0.27**	--		
11. SUD symptom count (Baseline)	0.27**	0.26**	0.24**	0.25**	0.21**	0.20*	0.11	0.11	0.21**	0.21**	--	
12. SUD symptom count (12 months after discharge)	0.29**	0.27**	0.21*	0.21*	0.19*	0.16	0.14	0.14	0.28**	0.33**	0.29**	--

IIP-C = Inventory of Interpersonal Problems–Circumplex version; SUD = Substance Use Disorder

* $P < .05$;

** $P < .01$

^J All zero-order correlations were calculated using Pearson product-moment correlations.

Table 3
Subscales of the IIP-C and Principal Component Loadings (N=174)

IIP-C Subscale	Component		
	1	2	3
Domineering	0.00	0.54	0.76
Vindictive	-0.12	0.79	0.46
Cold	0.14	0.90	0.14
Socially Avoidant	0.45	0.84	-0.04
Nonassertive	0.78	0.46	-0.01
Exploitable	0.94	0.11	0.11
Overly Nurturant	0.87	-0.01	0.24
Intrusive	0.51	-0.02	0.79

IIP-C = Inventory of Interpersonal Problems–Circumplex version