Family Functioning and Substance Use Severity among Adolescents upon Admission to Residential Substance Use Treatment

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Abstract

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Family Functioning and Substance Use Severity among Adolescents upon Admission to Residential Substance Use Treatment

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Using the Circumplex Model of Family Systems (Olson, 1989; 2000; Olson & Gorall, 2006), this study sought to conceptualize family functioning patterns and examine the relationship between family functioning and substance use severity in adolescents admitted to a residential substance use treatment center. More problematic family functioning (i.e., greater family disengagement, rigidly, enmeshment and chaos) and less healthy family functioning (i.e., lower balanced cohesion and lower balanced flexibility) was observed in the current sample compared to a non-clinical comparison sample. Substance use severity was operationalized using the Substance Abuse Subtle Screening Inventory-Adolescent-2 (SASSI-A2) and three groups of substance users were established (Low Severity, Moderate Severity, and High Severity; Miller & Lazowski, 2001). After controlling for family member substance abuse, peer substance use and the impact of trauma, family cohesion level was significantly related to substance use severity group. Study findings suggest that family based interventions need to incorporate a wide range of problematic patterns and family cohesion, in particular, is an important family functioning pattern that should be addressed in interventions for adolescents in residential substance use treatment settings.

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Introduction

Dysfunctional family environments are related to elevated rates of adolescent substance use disorders (SUDs); however, limitations in the assessment of family functioning have prevented a clear understanding of the relationship between family functioning and adolescent SUDs (Volk, Edwards, Lewis & Sprenkle, 1989; Risberg, Stevens, & Graybill, 1995). Additionally, although both increased substance use severity and dysfunctional family environments are related to lower rates of substance use treatment completion and higher rates of relapse to substance use (Brown, Myers, Mott, & Vik, 1994; Hendersen, Dakof, Schwartz & Liddle, 2006; Wu, Lu, Sterling & Weisner, 2004), the relationship between substance use severity and family functioning in adolescents undergoing residential treatment for problematic substance use remains poorly understood. This may be due, in part, to the paucity of studies examining this relationship between family functioning variables and substance use severity among clinical samples of adolescents with SUDs, a lack of agreement regarding the definition of "substance use severity," the frequent use of non-psychometrically validated scales to assess substance use severity, a narrow conceptualization of family functioning and a reliance on outpatient treatment samples (Chung, Martin, Winters & Langenbucher, 2001; Henderson et al., 2006; Nation & Heflinger, 2006; Thatcher & Clark, 2006; Wu et. al., 2004).

The current study addressed limitations in the conceptualization of family functioning patterns and the assessment methodology of substance use severity in adolescents with SUDs. Using the Circumplex Model (Olson, 1989), the current study

explored family functioning patterns, including enmeshment and chaos, that have been largely ignored in the contemporary literature on family functioning. This study also identified three distinct groups that represented three levels of substance use severity and examined the extent to which family functioning and non-family-related factors were related to substance use severity in adolescents in residential treatment for SUDs.

Adolescent SUDs: Rates, Treatment Approaches and Outcomes

Among youth in the United States between 12 and 17 years of age, 5% met DSM-IV-TR diagnostic criteria for a drug *or* alcohol abuse or dependence diagnosis and 2% met diagnostic criteria for *both* a drug and alcohol abuse or dependence diagnosis in 2008 (National Survey on Drug Use and Health [NSDUH], 2008). According to the Substance Abuse and Mental Health Administration's (SAMHSA) Treatment Episode Data Set (TEDS), substance abuse treatment admissions in the United States increased by 5% in adolescents between 1996 and 2006 (TEDS, 2008). In 2006-2007, 340,000 (1.4%) of adolescents aged 12-17 received substance use treatment and, of these, 59,000 (17% of the 340,000) were admitted to a residential treatment facility (NSDUH, 2007). Residential treatment typically requires the adolescent to spend 4 to 24 weeks in a single treatment center that provides individual and group psychotherapeutic services (TEDS, 2008; Williams & Chang, 2000). The goal of residential treatment is to provide the adolescent with the motivation, self-efficacy, and behavioral skills to refrain from relapsing to substance use upon discharge to his or her home community.

Most studies that examine adolescents with substance use disorders rely on outpatient samples (Williams & Chang, 2000). However, many important differences

exist between adolescents in outpatient and residential treatment and the extent to which findings from outpatient samples generalize to residential populations is unclear (William & Chung, 2000). Compared to outpatient samples, adolescents in residential treatment generally demonstrate higher rates of psychiatric comorbidity, a greater likelihood of sexual and/or physical abuse histories, higher rates of past (and unsuccessful) substance use treatment, more extensive criminal involvement, and a greater number of past arrests (Rounds-Bryant, Kristiansen & Hubbard, 1999; Williams & Chang, 2000). Relative to outpatient treatment, residential treatment includes more intensive services; an adolescent in residential treatment is typically in group or individual therapy/counseling for most of the day. Additionally, residential treatment facilities may be located several hours from the adolescent's family, making frequent visitation difficult, if not impossible.

While residential treatment enables many adolescents to reduce, or cease completely, their use of illicit substances, 50 to 86% of adolescents who complete treatment will relapse to substance use following treatment, many within 60 days of treatment completion (Brown, Myers, Mott & Vik, 1994; Cornelius et al., 2003; Hser et al., 2001). Adolescents who relapse to drug and alcohol use after completing residential treatment will be at-risk for serious health risks (e.g., hepatitis, STDs), mental health difficulties (e.g., depression, suicide, social isolation), legal problems (e.g., incarceration related to underage drinking, drug possession, prostitution), academic failure, and automobile accidents (Brannigan, Schackman, Falco & Millman, 2004; Rounds-Bryant et al., 1999). These troubling possibilities and high rates of relapse underscore the need for more effective relapse prevention interventions for adolescents with SUDs.

To address the constellation of risk factors related to the onset and maintenance of substance use problems, many contemporary interventions have adopted a "multidimensional" approach that addresses the adolescent's entire ecology (e.g., family members, peers, and classmates; Liddle & Dakof, 1995). A subset of multidimensional interventions has incorporated influences from family therapy, referred to as "family-based" multidimensional treatments (Liddle & Dakof, 1995). Family based multidimensional treatments are based on two assumptions; namely, that the family: (1) is an important factor in the development and onset of adolescent SUDs; and (2) can play an important role in the recovery of adolescents with SUDs (Kaufman, 1985; Liddle & Dakof, 1995). Among outpatient samples, the family based multidimensional treatment approach has resulted in lower rates of relapse, increased academic performance, and improved family functioning compared to treatments that focus primarily on the individual (Hogue, Dauber, Samuolis & Liddle, 2006; Liddle et al., 2001). However, family based, multidimensional interventions have been tested exclusively in outpatient settings and many of the target areas within the intervention (e.g., frequent family involvement, home visits) may be difficult to implement in residential treatment facilities. Although many residential treatment facilities recognize the value of integrating family members into treatment, few do so in a systematic manner because of logistical and financial reasons. Ultimately, a better understanding of family functioning patterns and the extent to which they are related to substance use severity in adolescents will be able to help guide the development of interventions that more efficaciously (and

realistically) incorporate the family of adolescents with SUDs into treatment (Gruber & Taylor, 2006).

The Circumplex Model

The Circumplex Model (Olson, 1989; Olson & Gorall, 2006) was chosen to conceptualize family functioning in the current study for several reasons. First, the main constructs of the model, family cohesion and family flexibility, are related to a variety of healthy and non-healthy behaviors in adolescents, including substance use (Olson, 1989). Second, the model assumes a curvilinear relationship between both cohesion and flexibility and problematic or healthy functioning. Both very low and very high levels of cohesion and/or flexibility are proposed to indicate problematic functioning, whereas moderate levels of flexibility and cohesion are proposed to indicate healthy, or balanced, functioning (Olson, 1989; Tiesel, 1994; Olson & Gorall, 2006). Third, the model includes a measurement of problematically high levels of cohesion and flexibility (i.e., enmeshment and chaos) that are often omitted or measured inadequately in most assessments of family functioning (Olson, 1989; Olson & Gorall, 2006). Most contemporary studies only assess a few aspects of family functioning failing to fully conceptualize family functioning, a limitation addressed in the current study through the use of the Circumplex Model (Nation & Heflinger, 2006; Olson & Gorall, 2006; Wu et al., 2004).

Central constructs of the model. The Circumplex model was originally created with the dual goals of better integrating research, theory, and clinical intervention and creating a cohesive model to conceptualize family functioning in the disparate fields of

family behavior and systems theory (Olson, 1989). Olson and colleagues (1989) examined a range of theories and concepts describing marital and family dynamics and identified several common themes throughout this large group of complex constructs. Specifically, the constructs of cohesion and adaptability/flexibility emerged, encompassing a wide range of factors. In the Circumplex Model, family *Cohesion*, defined as "the emotional bonding that family members have towards each other" (Olson & Gorall, 2006, p. 3) and family *Flexibility*, or the "the quality and expression of leadership, organization, and role relationships" (Olson & Gorall, 2006, p. 3) are composed of three levels (problematically low, moderate/balanced, and problematically high).

Disengagement and rigidity. In the Circumplex Model, family functioning patterns characterized by very low levels of cohesion are referred to as *Disengaged* and patterns characterized by very low flexibility are referred to as *Rigid* (Figure 1 & 2; Olson & Gorall, 2006). Studies conducted with earlier versions of the Family Adaptability and Cohesion Evaluation Scales (FACES; the Circumplex-based self-report measure of family functioning) found that adolescents in outpatient substance use treatment settings often reported their families as disengaged and rigid, family characteristics that have also emerged as related to lower rates of treatment completion and higher rates of relapse to substance use (Friedman, Utada & Morrissey, 1987; Volk et al., 1987). Furthermore, longitudinal research has shown that, in families of adolescents who received substance use treatment, levels of cohesion and flexibility started at lower levels and decreased more rapidly over a two-year period compared to non-problematic

substance users, suggesting that low cohesion and flexibility may be precursors to the development of SUDs (Needle et al., 1988).

Enmeshment and chaos. Based on the Circumplex Model, the opposites of problematically low cohesion and flexibility are problematically high cohesion and flexibility, classified as *Enmeshed* and *Chaotic* family functioning (Figure 1 & Figure 2). Enmeshed families are characterized by extreme emotional closeness, dependence, and demands for loyalty with individual needs being sacrificed for the group (Olson, 1989). Chaotic families are characterized by little structure, order or predictability, erratic leadership and impulsive decision making with inconsistent follow-through (Olson, 1989). Early theoretical views proposed that the development of substance use problems was related to overly-involved (enmeshed) parents who had difficulty accepting the adolescent's developmentally appropriate increases in independence (Weidman, 1983a; 1983b; West, Hosie & Zarski, 1987). Also, early research found elevated rates of parenting styles characterized as "laissez-faire," similar to the construct of chaos as assessed by the Circumplex Model, among adolescents receiving outpatient substance use treatment (Baumrind, 1991; Jurich, Polson, Jurich & Bates, 1985; Olson & Gorall, 2006).

In contrast, previous studies that used the FACES-II and FACES-III found very low rates of enmeshed and chaotic functioning among families of adolescents receiving outpatient substance use treatment which, along with changes in dominant theories, contributed to beliefs that enmeshment and chaos were not important family patterns among adolescents with SUDs (Friedman et al., 1987; Volk et al., 1989). However, later research indicated that the FACES-II and FACES-III were not adequately assessing

enmeshment and chaos, undermining the validity of earlier findings (Anderson & Gavazzi, 1990; Green, Harris, Forte & Robinson, 1990; Olson, 1991; Olson & Gorall, 2006). Accordingly, it is possible that family enmeshment and chaos are indeed important variables but have either been assessed inadequately or ignored by researchers to date (Volk et al., 1989; Weidman, 1983a). The new version of the FACES-IV, which is used in the current study, is intended to better assess enmeshment and chaos, and has received preliminary psychometric support for the assessment of these constructs (Olson & Gorall, 2006; Marsac & Alderfer, 2010; Mirnics, Vargha, Toth & Bagdy, 2010).

Substance Use Severity

Substance use severity is the most parsimonious indication of impairment among adolescents with a SUD at the onset of treatment and is related to both treatment completion and likelihood of relapse (Blood & Cornwall, 1994; Hsieh, Hoffman & Hollister, 1998). Establishing a relationship between substance use severity and family functioning at the start of treatment would speak to the importance of addressing family functioning patterns and incorporating family interventions into the standard treatment of adolescent substance users. The use of psychometrically-validated measures of substance use severity is a necessary prerequisite for effective treatment planning, as well as an important step towards clarifying the relationship between family functioning and substance use severity (Risberg, Stevens & Graybill, 1995).

Previous studies indicated that substance use severity, as measured by either number of abuse and dependence symptoms or psychological reliance on substances, was related to greater limit setting, more family conflict (Wu et al, 2004), lower cohesion, and

poorer family organization (Henderson et al., 2006) in adolescents at the onset of outpatient treatment. Conversely, other research found no relationship between family environmental factors (e.g., cohesion, conflict, parental love and parental control) and frequency of substance use in outpatient and inpatient adolescents (Nation & Heflinger, 2006; Pandina & Schuele, 1983). Among studies examining substance use severity, a number of operational definitions have been used to define substance use severity; however, no agreed upon conceptualization of substance use severity currently exists. Most studies assess only one aspect of substance use severity (e.g., frequency of use or primary substance of choice) likely capturing only part of the construct and assess severity using non-psychometrically validated instruments (Miller & Lazowski, 2001; Nation & Heflinger, 2004; Pandina & Schuele, 1983; Rogers, Cashel, Johansen, Sewell & Gonzalez, 1997; Thatcher & Clark, 2006; Volk et al., 1989; Wu et al., 2004).

Although the current study focused on the relationship between family functioning and substance use severity, other variables were considered in this study to determine the importance of family functioning patterns after considering these other important factors. Non-family functioning variables that were examined in this study included the demographic variables of age, gender, family structure, race and parental education (a proxy variable for socio-economic status). Psychosocial and treatment variables considered were psychological distress (i.e., symptoms of depression, impact of traumatic events), past substance use treatment, court referral to treatment, association with substance using peers, and family member problematic substance usage (Henderson et al., 2006; Nation & Heflinger, 2006; Pandina, & Schuele; Wu et al., 2004). These

variables were considered in the current study after an examination of past literature identified these variables as related to substance use severity, in community and outpatient samples (Henderson et al., 2006; Nation & Heflinger, 2006; Newcomb, 1995; Pandina, & Schuele; William & Chang, 2000; Wu et al., 2004).

In summary, while family functioning has been widely studied in adolescents with SUDs, several methodological limitations preclude a clear understanding of family functioning and its relationship with substance use severity in adolescents with a SUD. These limitations include: (1) previous studies have included a limited evaluation of family functioning variables and, in particular, have inadequately assessed very high flexibility and very high cohesion (Anderson & Gavazzi, 1990; Green et al., 1990; Olson, 1991; Olson & Gorall, 2006); (2) past research has relied on narrow conceptualizations and non-psychometrically rigorous assessments of substance use severity; and (3) the relationship between family functioning and substance use severity has been examined primarily in outpatient (i.e., not residential) samples.

Study Hypotheses

The following hypotheses were tested in the current study:

i) It was hypothesized that the current sample of adolescents in residential treatment for substance use problems would report higher levels of pathological family functioning (i.e., higher disengagement, rigidity, enmeshment and chaos) and lower levels of healthy family functioning (i.e., lower balanced cohesion and flexibility) compared to a pre-existing comparison sample composed of 467 college students (64%) and adult community members (36%) who did not report

clinically significant psychopathology or problematic substance use (Gorell, 2002).

ii) It was hypothesized that family functioning variables would account for a significant and clinically meaningful amount of variance explained in substance use severity group, after controlling for non-family functioning variables (e.g., demographic variables, family` and peer substance use, and psychological distress).

Methods

Participants and Procedures

Current sample. Participants in this study were part of a larger parent project that examined patterns and predictors of treatment outcomes in adolescents completing treatment for SUDs in a residential treatment program in Southeastern Ohio. The larger parent study included 308 participants. Inclusion criteria for participation in the parent study was: (1) 12 to 18 years of age; (2) being formally admitted to adolescent substance abuse treatment program for residential treatment; (3) provision of informed assent and legal guardian consent; and (4) proficiency in the English language. During the participant's intake evaluation, the study was explained and if the adolescent wished to enroll in the study, informed assent and consent were obtained from the participant and the participant's legal guardian. The participant and legal guardian were informed that data from the participant's clinical chart and measures administered by research assistants would be used in the study. Staff members of the treatment center were trained in the procedures of the study and were prepared to answer any questions that potential participants might have. The participants were informed that their decision to enroll in the study would have no impact on the quality or quantity of care that they received during or after their residential treatment. Data was obtained from participants during their routine intake evaluation for admission to the treatment facility, at treatment discharge, and at 7-day, 1-month, 6-month and 12-month follow-up.

All data analyzed in the current study was collected at admission to the residential treatment program. Participants were included in the data analytic effort of the current

study if they had completed both the Family Adaptability and Cohesion Scales-IV (FACES-IV) and the Substance Abuse Subtle Screening Inventory-Adolescent -2 (SASSI-A2), the primary measures of the current study. The current sample included 139 adolescents, the majority were male (68%), Caucasian (91%), and reported living in a single-mother head of household family (52%). The average participant age was 16.24, most reported previous substance use treatment (72%) and over one-half (57%) were court-ordered for treatment (Table 1). The length of treatment for each participant differed but was typically between 30 and 45 days.

Comparison sample. The comparison sample used to test the current study's first hypothesis consisted of 467 community residing individuals who were originally gathered for the purpose of validating the FACES-IV (Gorall, 2002). This comparison group was used in the current study to test if adolescents in residential treatment did, in fact, perceive poorer family functioning as assessed by the newer version of the FACES (past research of this type had used the earlier versions of the FACES). The comparison group consisted of college students (64%) assembled through non-probability sampling and community members (36%) assembled through "snowball" sampling.

Assessment Instruments

Measures were completed during the adolescent's standard one-hour intake evaluation and during a one-hour one-on-one session with a research assistant during their first week of treatment. Descriptive characteristics including means, standard deviations and proportions for all measures can be found in Table 1 and 2.

Solutions for Ohio's quality improvement and compliance (SOQIC) (appendix A1). The SOQIC is the standard intake assessment used at the participating residential treatment facility. Participants' gender, age, race, educational level of parents (proxy variable for socio-economic status) and information about previous substance use treatment, court referrals to treatment, family structure, and family member substance abuse was collected in this interview.

Family adaptability and cohesion evaluation scales-IV (FACES-IV: Olson Gorall, & Tiesel, 2004; appendix A2). The FACES-IV is a 62 item self-report scale that was used to assess the adolescent's perception of important aspects of their family environment (Olson & Gorall, 2006). Each item used a 5 point scale, ranging from "Does Not" (0) to "Very Well" (5). The measure included four "unbalanced" scales, each with seven items that assessed the extreme (i.e., very low or very high) patterns of family functioning: family Disengagement (Cronbach's alpha was 0.76), family Enmeshment (Cronbach's alpha was 0.76), family Rigidity (Cronbach's alpha was 0.79), and family Chaos (Cronbach's alpha was 0.72). The measure also included two "balanced" scales, also with seven items in each: family Balanced Flexibility (Cronbach's alpha was 0.83), and family Balanced Cohesion (Cronbach's alpha was 0.82). Additionally, the measure included subscales that assessed family Satisfaction (Cronbach's alpha was 0.95) and family Communication (Cronbach's alpha was 0.92), both of which were 10 item scales (Table 2). Cronbach's alphas for the FACES-IV were based on data from the current study.

A Cohesion Level was derived (i.e., Very Low Cohesion, Balanced Cohesion, or Very High Cohesion) based on a composite score of balanced Cohesion and the unbalanced scales of Disengagement and Enmeshment. Both Disengaged and Enmeshed Levels of Cohesion indicated problematic patterns of family functioning. Similarly, a Flexibility Level was derived (i.e., Very Low Flexibility, Balanced Flexibility, or Very High Flexibility) based on a composite score of balanced Flexibility and the unbalanced scales of Rigidity and Chaos. Both Rigid and Chaotic Levels of Cohesion indicated problematic patterns of family functioning. Finally, an Overall Functioning Level (i.e., Balanced Overall Functioning, Mid-Range Overall Functioning or Extreme Overall Functioning) which accounts for both Cohesion Level and Flexibility Level was calculated (Olson, 1989; Olson & Gorall, 2006; Figure 2; Figure 3).

In the current sample, 46% (n = 64) of participants indicated that their families had Balanced Overall Functioning, 33% (n = 46) reported problematic Cohesion or Flexibility Levels (Mid-Range Overall Functioning) and 22% (n = 29) reported problematic Cohesion and Flexibility Levels (Extreme Overall Functioning; see Table 1 and Figure 3). In terms of Cohesion Level, 60% (n = 83) reported Balanced Cohesion Levels, 36% (n = 50) of participants reported Disengaged Levels of Cohesion, and 4% (n = 6) reported Enmeshed Levels of Cohesion. Similarly, in regard to Flexibility Levels, 65% (n = 91) reported Balanced Levels of Flexibility, 32% (n=44) reported Rigid Levels of Flexibility and 3% (n = 4) reported Chaotic Levels of Flexibility. On the Circumplex Map, of the 29 participants (21%) who reported problematic levels of both Cohesion and Flexibility, 93% (n = 27) fell in the Rigidly-Disengaged quadrant of functioning, 3% (n =

2) of the sample fell into Chaotically-Enmeshed quadrant, 3% (n = 2) of the sample fell into the Rigidly-Enmeshed quadrant and no participants fell into the Chaotically-Disengaged quadrant (Figure 3).

Impact of events scale-revised (IES-R: Horowitz, Wilner & Alverez, 1979; appendix A3). The IES-R was used to assess psychological stress reactions after any major event. The IES-R asked each participant to recall the past traumatic event that was most distressing to him/her and then rate how often both intrusive experiences and avoidance of thoughts and images associated with the event had occurred in the past 7 days. The IES-R consists of 15 items and each item used a 6 point scale (0="not at all" to 5="often") to indicate level of agreement with higher scores representative of greater distress. The possible scores ranged from 0 to 75 and Cronbach's alpha was 0.86 in the current study. The mean score in the current sample was 38.20, falling in the moderate range of distress (Table 2).

American drug and alcohol survey (ADAS: Oetting, Edwards, & Beauvais 1985; appendix A4). This measure contained several subscales assessing various aspects of an adolescent's drug and alcohol use (Oetting et al., 1984). For purposes of the current study, a 7 item subscale from the ADAS designed to measure the extent of peer substance use was used. Responses ranged from "none" (0) to "all of them" (3) and were summed to form the scale score of "association with substance using peers". In the current sample, Cronbach's alpha was 0.82 (Table 2).

Beck depression inventory –II (BDI-II; Beck, Steer, Ball & Ranieri, 1996; appendix A5). The BDI-II is a 21-item self-report measure that assessed participants'

depressive symptomatology. Each item used a 4 point response scale (with scores ranging from 0 to 3). Possible scores ranged from 0 to 63, with higher scores indicative of greater depressive symptomatology. In the current sample, Cronbach's alpha was 0.89 and the mean score was 15.18, which indicated mild-to moderate depressive symptomatology (Table 2).

Substance abuse subtle screening inventory-adolescent version-2 (SASSI-A2: Miller & Lazowski, 2001; appendix A6). The SASSI-A2 is a well-validated, easy to administer measure used to assess the severity of substance use and the likelihood of a SUD among adolescents in a variety of settings (Kenneth, Gerald, Thobro & Hass, 2004; Miller & Lazowski, 2001; Risberg et al., 1995; Rogers et al., 1997). Ten subscales directly and indirectly assess severity of substance use and nine decision rules determine whether the profile indicates a high or low probability of a substance use disorder (Miller & Lazowski, 2001; Table 3). Studies have found high rates of agreement (91 to 97%) between the SASSI-A2's ability to differentiate between individuals with and without a SUD and counselor diagnosis of a SUD based on DSM-IV criteria (Feldstein & Miller, 2007; Rogers et al., 1997; Miller & Lazowski, 2005).

As expected in a highly problematic sample, 99% of participants in the current study met criteria for a "high probability of a SUD" based on all nine decision rules and 100% of the sample had received at least one DSM-IV diagnosis of a SUD by a counselor. Thus, consistent with usage of the measure in past studies, the Face Valid Alcohol scale (FVA) and Face Valid Other Drug scale (FVOD) scale were used to establish distinct groups of substance use severity (e.g., Rogers et al., 2003). In past

studies, both scales have demonstrated adequate sensitivity and specificity when used to classify an adolescent's probability of a SUD and they allow for the formation of clinically meaningful groups (Feldstein & Miller, 2007; Rogers et al., 2003). The FVA is a 12 item scale and the FVOD is a 16 item, both with responses to each item ranging from 0 to 3. The anchors are "never" (0) and "repeatedly" (3) and scale items are summed with higher scores indicating more severe alcohol/drug usage. A score of 12 or greater on either the FVA or FVOD indicates a high likelihood of a SUD (Miller & Lazowski, 2001). In the current sample, on the FVA scale, Cronbach's alpha was 0.85 and the mean score was 9.49, falling below the cut-off for a high likelihood of a SUD. On the FVOD scale, Cronbach's alpha was 0.91, and the mean score was 24.63 which fell above the cut-off for a high likelihood of a SUD (Table 2).

The first group that was identified based on FVA and FVOD scores was the "low severity group." This group did not exceed the cut-off score for a high likelihood of an alcohol or a drug use disorder based on the FVA or FVOD scales. The low severity group consisted of 18 participants (13%). The second group that was identified was the "moderate severity group" which met criteria for the likelihood of either a drug use disorder or an alcohol use disorder based on scores on the FVA and FVOD scales. This group contained 77 participants (55%) and, of these 77, 76 met or surpassed the cut-off on the FVOD indicating a high probability of a drug use disorder while only one participant met or surpassed the cut-off for the FVA, indicating a high probability of an alcohol use disorder. The third group identified was the "high severity group" which met

criteria for both a drug and alcohol use disorder based on the FVA and FVOD scales. This group consisted of 44 participants (32%). Please see Table 1.

Data Analytic Procedure

First, the family functioning patterns (i.e., Disengagement, Balanced Cohesion, Enmeshment, Rigidity, Balanced Flexibility and Chaos) of study participants were compared to the family functioning patterns of a comparison sample with a series of independent t-tests, using pooled degrees of freedom and assuming unequal variances (Table 4). Next, one-way ANOVA's compared the means of the three substance use severity groups (i.e., low, moderate and high) on the scales of the SASSI-A2 (i.e., face valid alcohol use, face valid drug use, family/friend environmental risk, attitudes and beliefs common among problematic substance users, consequences of substance users, characteristics associated with substance misuse, personality style common among problematic substance users, and defensiveness regarding substance use; Table 5 and Table 6). Then, to identify potential variables for inclusion in the final multinomial logistic regression model, bivariate correlations examined the relationship between predictor variables (i.e., gender, race, custody, highest level of education in primary household, previous substance use treatment, family member substance use, court ordered to treatment, Cohesion Level, Flexibility Level, Overall Level, Disengagement, Rigidity, Enmeshment, Chaos, Satisfaction, Communication, BDI-II scores, IES-R scores, and substance using peers) and substance use severity group (i.e., low vs. moderate severity, low vs. high severity, moderate vs. high severity; Table 7; Tabachnick & Fidell, 2001). Categorical variables were dummy coded so that pairwise bivariate

correlations between each of the levels could be conducted. As the rates of Very High Cohesion (i.e., Enmeshment, $n = 6$) and Very High Flexibility (i.e., Chaos, $n = 4$) were prohibitively low for inclusion in a multinomial regression model, both Cohesion Level and Flexibility Level were considered as two-level variables consisting of Very Low and Balanced Levels. Non-family functioning demographic and psychosocial predictor variables were chosen based on their relationship to substance use severity in previous studies (for a longer description, see page 13). Variables which were correlated with substance use severity group at greater than 0.20 were considered for inclusion in the multinomial logistic regression model.

Substance use severity level (i.e., low, moderate, high) formed the three level categorical outcome variables for the multinomial logistic regression model. The multinomial logistic regression model included two blocks: the first block included significant non-family functioning covariates and the second block included significant family functioning variables. The blocks were formed first, by including all variables which were correlated with substance use severity group at greater than 0.20 and then, by including only variables which were significantly related to substance use severity group in the presence of the other predictor variables in the model. Association with substance using peers, IES-R scores, BDI-II scores and family member substance abuse were considered for the first block, but BDI-II score did not explain additional significant variance in the model. Thus, the final model included association with substance using peers, IES-R scores, and family member substance abuse as the first block. Cohesion Level and Rigidity were both considered for inclusion in the second block, but Rigidity

did not explain additional variance so the final model only included Cohesion Level as the second block (Table 8).

Results

Data Screening

Skewness, kurtosis and outliers were assessed for all variables using both statistical (e.g., means, standard deviations) and visual analyses (e.g., scatterplots, frequency distributions; see Table 1 and Table 2). Differences were examined between (i) participants in the current study for whom data were available and for whom data were missing, (ii) participants in the current study (N = 139) and the larger parent study (N = 308), and (iii) participants in the current study (N = 139) and the pre-existing comparison sample (N = 467). Differences were found on the scale of Enmeshment between individuals in the current study for whom parent education level was, and was not, collected, $t(137)$ = -2.00, p = .05. Individuals for whom parental education data was not collected (M = 15.85, SD = 5.00) reported higher Enmeshment than individuals for whom parental education data was collected (M = 13.45, SD = 4.97). No differences were found between the current and parent sample, suggesting that this smaller subsample was representative of the parent sample. Several differences were noted between the current sample and the comparison sample. The comparison sample was older (M = 27.7 years) than the residential sample (M = 16.24 years), t (225) = 10.66, p < .01. The comparison sample also consisted of more females (71%) than the residential sample (32%), z = 8.15, p < .01. Finally, the proportion of Caucasians in the comparison sample was 82%, compared to 91% of the residential sample, z = 2.17, p < .05 (Gorall, 2002).

Bivariate correlations were conducted among all predictor variables to assess for the presence of multicollinearity (Table 7; Tabachnick & Fidell, 2001). Overall

Functioning Level (balanced versus extreme levels) was highly correlated with both Flexibility Level (r = -.99) and Cohesion Level (r = -.98) and therefore these variables were not entered into the regression analysis simultaneously. These high correlations were expected as Overall Functioning Level is comprised of the same items contained in the subscales of Cohesion Level and Flexibility Level. While several other pairwise correlations were significant among predictor variables, none exceeded r=.80, the cutoff correlation coefficient typically used to identify the presence of multicollinearity (Tabachnick & Fidell, 2001).

Hypothesis 1: Comparison of Family Functioning Patterns

Family functioning patterns reported by adolescents in the current sample were compared to the comparison sample to assess if adolescents in residential treatment for substance use problems reported higher levels of problematic functioning (i.e., higher Family Disengagement, Family Enmeshment, Family Rigidity and Family Chaos) and lower balanced functioning (i.e., lower Balanced Cohesion and Balanced Flexibility). Although the comparison sample differed from the residential sample in several meaningful ways, this was the best available comparison given that the FACES-IV is a newly released version of the FACES and normative samples, non-clinical adolescent samples or clinical comparison samples are not available. Although comparisons between the FACES-IV and earlier versions of the FACES is feasible, only the sub-scales of balanced cohesion and flexibility can be compared, limiting the utility of the comparison between the current sample and samples assessed with earlier versions of the FACES.

As hypothesized, the current sample evidenced significantly higher levels of Disengagement, $t(224) = 6.63$, $p < .01$, $d = .64$, and Rigidity, $t(238) = -2.40$, $p < .05$, $d = .23$ than the comparison sample. Also, the current sample evidenced significantly higher levels of Enmeshment, $t(226) = 6.45$, $p < .01$, $d = .66$, and Chaos $t(222) = 5.73$, $p < .01$, $d = .55$ than the comparison sample. The current sample of adolescents also reported significantly less healthy functioning, indicated by lower levels of Balanced Cohesion, $t(226) = -7.11$, $p < .01$, $d = .69$, and lower levels of Balanced Flexibility, $t(202) = 4.15$, $p < .01$, $d = .42$ (Table 4).

Hypothesis 2: Predictors of Substance Use Severity Group

Substance use severity groups. Prior to conducting the multinomial logistic regression analysis, further exploration of differences between the three substance use groups based on direct and indirect indications of substance use severity was undertaken using a series of one-way ANOVAs (Table 6). As expected, significant overall differences emerged on all scales, indicating that the three groups exhibited significantly different profiles of substance use and risk factors associated with problematic substance use. Tukey's post hoc tests indicated that the high severity group was associated with significantly higher scores on several scales of direct and indirect substance use than the moderate severity group or low severity group and the moderate severity group was associated with higher scores on several scales of direct and indirect substance use than the low severity group. The exception to this pattern was defensiveness about one's substance use which was significantly higher in the low severity group than either the moderate severity or high severity Group (Table 6).

Bivariate correlations. Bivariate correlations examined the relationship between predictor variables and substance use severity group (Table 7). The family functioning variables of Rigidity and Cohesion Level were significantly correlated with substance use severity group (Rigidity: $r_{\text{low vs. moderate severity}}$ =.25, $r_{\text{low vs. high severity}}$ = .27; Cohesion Level: $r_{\text{moderate vs. high severity}}$ = -.19; Table 7). Additionally, substance use severity group was related to the non-family functioning variables of IES-R score ($r_{\text{low vs. moderate severity}}$ = 0.30, $r_{\text{low vs. high severity}}$ = 0.32), Substance Using Peers ($r_{\text{low vs. moderate severity}}$ =.24, $r_{\text{low vs. high severity}}$ = .50, $r_{\text{moderate vs. high severity}}$ =.30), Family Member Substance Abuse ($r_{\text{low vs. moderate severity}}$ =.35, $r_{\text{low vs. high severity}}$ = .35, $r_{\text{moderate vs. high severity}}$ =.30) and BDI-II score ($r_{\text{low vs. high severity}}$ = .24; Table 7).

Multinomial logistic regression analysis. IES-R score, association with substance using peers, and family member substance abuse were included in the first block of the final Multinomial Logistic Regression model. The first block was significantly related to substance use severity group, $G^2(6, N = 105) = 37.05$, $p < .001$, *Nagelkerke* $R^2 = .34$ (Table 8). Cohesion level was added as the second block and explained a significant amount of additional variance in the model, above and beyond the variance explained by the first block, $\Delta G^2(2, N = 105) = 6.51$, $p = .05$, Δ*Nagelkerke* $R^2 = .05$. The entire model including IES-R, family member substance abuse, association with substance using peers, and cohesion level was significant, $G^2(8, N = 105) = 43.56$, $p < .001$, *Nagelkerke* $R^2 = .39$ (Table 8).

In the final model, in the presence of the other variables, association with substance using peers was significantly related to substance use severity group in the

presence of the other predictor variables, $G^2(1, N = 105) = 15.09$, $p < .01$. Greater association with substance using peers was reported in the high severity group than in either the low severity group or the moderate severity group, Wald $X^2(1, N = 105) = 9.88$, $p < .01$, $OR = 1.42$; Wald $X^2(1, N = 105) = 7.44$, $p < .01$, $OR = 1.21$. Family member substance abuse was significantly related to substance use severity group, $G^2(1, N = 105) = 12.73$, $p < .01$ and family member substance abuse was more common in both the moderate severity and the high severity group than the low severity group, Wald $X^2(1, N = 105) = 10.61$, $p < .01$, $OR = 17.54$; Wald $X^2(1, N = 105) = 4.77$, $p < .05$, $OR = 7.09$. Finally, IES-R scores were significant related to substance use group, $G^2(1, N = 105) = 7.56$, $p = .02$, and scores were significantly higher in both the moderate severity and the high severity group compared to the low severity group, Wald $X^2(1, N = 105) = 5.42$, $p < .05$, $OR = 1.06$; Wald $X^2(1, N = 105) = 5.94$, $p < .05$, $OR = 1.06$ (Table 8).

In the presence of the other variables, Cohesion Level was a significant predictor overall, $G^2(1, N = 102) = 6.51$, $p = .04$. Balanced (healthier) Cohesion Levels were more likely in the moderate severity than the high severity group, Wald $X^2(1, N = 105) = 3.86$, $p < .05$, OR = 2.63. Balanced (healthier) Cohesion Levels were also more likely in the moderate severity group than in the low severity group, Wald $X^2 (1, N = 105) = 3.90$, $p < .05$, OR = 5.56. Cohesion Level was not significantly different in the low severity group and the high severity group (Table 8).

Overall, the model was a good fit for the data as indicated by a highly non-significant deviance chi-square goodness-of-fit, $X^2(200, N = 105) = 163.80$, $p = .97$. The

model was able to correctly classify 43% of low severity group participants, 81% of moderate severity group participants, and 63% of high severity group members.

Discussion

The current study offered advancements in the conceptualization of family functioning and its relationship to substance use severity, using a validated method of assessing substance use severity. Consistent with previous findings, the current sample of adolescents referred for residential substance use treatment reported family environments characterized by higher levels of disengagement and rigidity relative to a comparison sample comprised of college students and community members without SUDs or other clinically significant problems (Gorall, 2002). Findings of elevated rates of enmeshment and chaos were also observed, supporting the central hypothesis of the Circumplex Model which proposes that the constructs of cohesion and flexibility have a curvilinear relationship with family functioning, such that both problematically low and problematically high cohesion and flexibility will be related to problematic functioning (Olson, 1989; Olson, 2010). Additionally, after controlling for significant demographic, psychological and psychosocial variables, family cohesion was significantly related to substance use severity group. Specifically, both adolescents with relatively lower alcohol and drug use (i.e., low severity group) and adolescents with high drug and alcohol use (i.e., high severity group) were characterized by higher rates of disengaged cohesion levels than adolescents with either high alcohol or high drug use (i.e., moderate severity group).

Family Functioning Patterns

Disengagement and balanced cohesion. The first hypothesis proposed that adolescents at the onset of residential substance use treatment would evidence elevations

on the subscales of disengagement, rigidity, enmeshment and chaos and lower levels of balanced cohesion and flexibility than a comparison sample of non-problematic individuals. Consistent with this hypothesis, adolescents receiving residential treatment reported higher levels of disengaged functioning and lower levels of balanced cohesion than the comparison sample. Past studies clearly indicate that low family cohesion, characterized by emotional separation, a lack of sharing of feelings, and little involvement by family members in each other's lives, is associated with elevated rates of adolescent SUDs, less participation in treatment programs, and higher rates of substance use severity (Henderson et al., 2006; Needle et al., 1988; Olson, 1989; Volk et al., 1989). In turn, family based-interventions such as Multidimensional Family Therapy (MDFT) that aim to increase cohesion though facilitating improved communication and increased parent-child emotional connections, would likely benefit a large proportion of adolescents in residential substance use treatment (Hogue et al, 2006; Liddle et al., 2001).

Rigidity and balanced flexibility. Greater rigidity and lower levels of balanced flexibility were reported by the current sample than the comparison sample consistent with previous studies (Friedman et al., 1987; Needle et al., 1988). This is noteworthy because it is potentially inconsistent with current behaviorally-based family interventions which are often geared towards increasing family structure and behavioral consequences (Rowe, Liddle, McClintic & Quille, 2002). Study findings suggest that interventions for rigid families need to be geared towards promoting role flexibility, decreasing the harshness of consequences and establishing better negotiation skills (Walsh & Olson,

1989). Future research is needed to confirm the efficacy of interventions targeting rigid functioning patterns.

Enmeshment and chaos. Consistent with both the study's hypothesis and Circumplex Model theory, in addition to findings of elevated levels of disengagement and rigidity, elevations were also reported on the scales of enmeshment and chaos, constructs that are frequently overlooked in contemporary research. Enmeshment is characterized by extreme emotional closeness, a lack of generational boundaries, and a low tolerance for individual friends or interests (Walsh & Olson, 1989). Commonly used family-based interventions often seek to increase cohesion (Rowe et al., 2002); an aim that is likely to be ineffectual and potentially detrimental to a family whose predominant functioning pattern is enmeshed (Walsh & Olson, 1989). Family-based interventions may need to be altered to accommodate the distinct needs of enmeshed families, including the establishment of healthy boundaries and independent friends and interests (Walsh & Olson, 1989). Chaos, characterized by erratic leadership and ineffective discipline has rarely been studied in the area of adolescent substance use. The primary therapeutic goal with a chaotic family is to build structure through consistent consequences, rules and role expectations (Walsh & Olson, 1989). Variables such as low parental monitoring, poor limit setting and a lack of consequences for behaviors are often addressed in family-based treatments and may be effective for building structure among chaotic families (Liddle et al., 2001; Rowe et al., 2002; Weinberg, 1998; Wu et al., 2004).

FACES-IV. Consistent with the central hypothesis of the Circumplex Model, results indicated that both problematically low and problematically high levels of cohesion and flexibility are present among adolescents at the onset of residential treatment, emphasizing the need for assessment of the full range of cohesion and flexibility (Olson & Gorall, 2006). Relative to previous versions of the FACES, the FACES-IV was designed to better capture the enmeshment and chaos and the initial validation study of the FACES-IV, consisting of 467 non-problematic college studies and adults, indicated the improved ability of this measure to capture these constructs (Marsac & Aldefer, 2010; Olson & Gorall, 2006). Additionally, two recent studies released further psychometric properties of the FACES-IV, the first of which examined the cross-cultural applicability of the FACES-IV in a Hungarian sample of 498 adults (249 couples; Mirnics et al., 2010). They found strong internal consistency among the sub-scales, similar factor structures and correlation patterns to the initial US sample, supporting the reliability and validity of the FACES-IV (Mirnics et al., 2010; Olson & Gorall, 2006). The second study examined the psychometric properties of the FACES-IV among 147 mothers and 40 fathers from 162 families of children with cancer (Marsac & Alderfer, 2010). In contrast to Mirnics and colleagues (2010), the authors expressed significant concerns about the scale of enmeshment, noting the relatively low internal consistency of 0.65 for both mothers and fathers, non-relation to other measures of family functioning and significant, and positive correlation with disengagement, with which it should have a significant, negative correlation (Marsac & Alderfer, 2010). Finally, the lack of large-scale, representative norms and the lack of clinical comparison

groups were noted as limitations of the FACES-IV in both studies (Marsac & Alderfer, 2010; Mirnics et al., 2010). Until more extensive psychometric properties are released, there is a chance that the same problem that plagued earlier versions of the FACES, specifically the non-adequate assessment of enmeshment and chaos, will continue to be a concern and thus, results should be interpreted with this limitation in mind.

Family Functioning and Substance Use Severity

The study's second hypothesis suggested that family functioning variables would be related to substance use severity group. Findings indicated that adolescents in both the low severity group and the high severity group reported increased rates of problematically low (disengaged) family cohesion levels compared to adolescents in the moderate severity group. Interestingly, no other family functioning variables were related to substance use severity group after considering the impact of non-family functioning risk factors. Past researchers have suggested that family functioning patterns may have a larger role in influencing substance use in the pre-adolescent period whereas peer groups become more important during adolescence (Newcomb, 1995). Family functioning variables may be less directly influencing substance use among adolescents and rather indirectly influencing substance use patterns, for instance, through the adolescent's choice of peer group, or the academic expectations placed on the adolescent, both of which are directly related to substance use severity (Henderson et al., 2006; Jurich & Pandina, 1991; Newcomb, 1995).

Low cohesion and high substance use severity group. Previous research is inconsistent regarding the relationship between low cohesion and substance use severity.

However, in both the current study and the only previous study (Henderson et al., 2006) to use a psychometrically validated instrument to assess substance use severity (i.e., Personal Involvement with Chemicals Scale) low cohesion was related to higher substance use severity. This indicates that a more extensive conceptualization and assessment of substance use severity may capture this relationship better. Among families with low cohesion, engagement in treatment is frequently a difficult goal, particularly in residential treatment where family members may not live in the vicinity of treatment. The level of commitment of family members needed in current family-based multidimensional treatments may not be a realistic expectation among families with low cohesion, and may be a limitation of current family-based treatment options (Olson, 1989). It is important to consider the level of involvement that is feasible for the family and future research is needed to examine which components of family based treatments are most needed for efficacious results and adequate completion rates by families. For instance, as parental attendance in recovery groups (e.g., AA, Al-Anon) following treatment is related to decreased rates of relapse, an important goal may be to ensure follow-up participation of the family even if a family was not involved in the treatment process (Hsieh et al., 1998).

Low cohesion and low substance use severity group. Contrary to the majority of previous research (Henderson et al., 2006; Volk et al., 1989), adolescents who reported lower levels of self-reported drug and alcohol use (i.e., low severity group) had elevated rates of disengaged levels of cohesion relative to both adolescents with either high drug or high alcohol use (i.e., moderate severity group). First, a statistical explanation is

offered which may explain this unanticipated finding. Bivariate correlations identified a non-significant relationship between cohesion level and substance use severity when low and moderate severity groups were compared. However, cohesion level was significantly correlated with substance use severity group when moderate and high severity was compared and thus, cohesion level was included in the regression model. In the presence of family substance abuse, association with substance using peers and IES-R scores, a significant relationship existed between cohesion level and low versus moderate severity. This relationship is considered a suppression effect and leads to a statistically significant variable, but one of questionable theoretical validity (Tabachnick, & Fidell, 2001).

Alternatively, it is important to consider a possible theoretical explanation for the relationship between cohesion and substance use severity when in the presence of family substance abuse, association with substance using peers and impact of trauma. Among other variables, the low severity group is differentiated from the moderate severity group by lower rates of family substance abuse, higher levels of defensiveness regarding substance use, higher levels of rigidity and lower rates of balanced levels of cohesion in the current study. Among families with members who misuse substances, an increased modeling of substance using behavior and increased family acceptance of substance use are a few ways that increased risk of SUDs may be transferred to adolescents (Denton, 1994; Weinberg, 1998). Because low severity adolescents may have significantly lower rates of family substance abuse, family members of these adolescents may be less accepting of the adolescent's substance use and exert greater pressure on the adolescent to curb their usage. This pressure to decrease substance use may be perceived as

unwarranted criticism by an adolescent who is defensive about his/her substance use and may in turn, encourage the adolescent to characterize his/her family as rigid and disengaged. Future research is needed to examine whether this theoretical account may explain the high rates of low family cohesion levels among the low severity group.

Limitations

The current study has several limitations. First, the study's cross-sectional design precludes one from making any cause-effect relationships. This prohibits one from making the conclusion that dysfunctional family patterns are causing changes in substance use severity as changes in substance use severity may be causing changes in family functioning patterns. Second, a very small number of adolescents in this study reported enmeshed or chaotic levels of functioning, which limited the ability to examine the relationship between individuals who reported enmeshed or chaotic patterns of functioning and substance use severity. Third, this study lacked a control group and the comparison sample significantly differed from the current sample in age, gender and race/ethnicity. Fourth, there is a lack of extensive psychometric validation, normative or clinical comparison groups for the FACES-IV. Thus, it is preemptive to conclude that this new version of the model is more successfully capturing the problematically high levels of enmeshment and chaos as it was intended, a limitation of the current study. Additionally, the proportion of the current study sample reported living in a single parent household (68%), was higher than rates in past studies using the FACES, and this difference may have affected ratings of family functioning patterns. Fifth, this study lacked an objective outcome measure or collateral parental report, to supplement self-

report data. Also, the study relied entirely on self-report data and much of the data used were from the adolescent's intake evaluation. Thus, a bias towards socially desirable responses may have occurred as the adolescent hoped to positively impact treatment length and/or please counselors and staff. Finally, the extent to which the current sample is representative of the general population of adolescents receiving residential substance use treatment is unclear. The sample was composed entirely of adolescents residing in Ohio, and most of the sample was Caucasian.

Implications and Future Directions

In spite of these limitations, the current study offered an expanded conceptualization of family functioning in adolescents with SUDs in residential treatment. Several subscales of problematic functioning were elevated among the residential sample relative to a comparison sample including elevated levels of disengagement, rigidity, chaos and enmeshment. This is informative as the majority of research regarding family functioning patterns among adolescents with SUDs assess very low levels of cohesion (disengagement) and flexibility (rigidity) but fail to assess the very high levels of cohesion (enmeshment) and flexibility (chaos) (Olson & Gorall, 2003). Findings from this research indicate that the effectiveness of family-based treatments may be enhanced by increasing the heterogeneity of assessment methods and interventions to address dysfunctional family patterns of both problematically low or high cohesion and flexibility (Liddle 1995; Olson, 1989; Olson & Gorall, 2006; Rowe et al., 2002). Current multidimensional treatments that often aim to increase cohesion and establish more structure and consistency among family members may be effective for

disengaged and/or chaotic families. However, for enmeshed and rigid families, existent treatments may need to be altered to effectively move these families from unbalanced to balanced levels of functioning. Overall, effectiveness of treatment will likely be enhanced by the systematic incorporation of family members into treatment, the assessment of enmeshment and chaos, and individually structuring interventions in accordance with family levels of commitment to participation in treatment.

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Table 1

Descriptive Statistics of Sample: Categorical Variables

	Total Number	%
Gender	139	
Male	94	67.6
Female	45	32.4
Race	139	
Caucasian	127	91.4
Other	12	8.6
Custody[a]	135	
Mother	71	52.6
Father	20	15.2
Both Parents	24	17.8
Other	40	14.4
Highest level of education in primary household[b]	119	
Some High School/GED/HS Diploma	64	53.8
Some College/Trade School or more	55	46.2
Previous SU Treatment [c]	135	
Yes	100	71.9
No	35	25.2
Family Member Substance Abuse [d]	132	
Yes	104	78.8
No	28	21.2
Court Ordered to Treatment [e]	116	
Yes	66	56.9
No	50	43.1

Cohesion Level	139	
Disengaged	50	36.0
Balanced	83	59.7
Enmeshed	6	4.3
Flexibility Level	139	
Rigid	44	31.7
Balanced	91	65.5
Chaotic	4	2.9
Overall Level	139	
Balanced	64	46.0
Mid-Range	46	33.1
Extreme	29	20.9
Substance Use Severity Group	139	
Low Severity Group	18	12.9
Moderate Severity Group	77	55.4
High Severity Group	44	31.7

Table 2

Descriptive Statistics: Continuous Variables

Variables	N	M	SD	Obtained Range	Possible Range	Alpha	Standard Skew
Age	139	16.24	1.03				
Disengagement[a]	139	16.79	5.59	7-34	1-35	.76	1.06
Balanced Cohesion[a]	139	22.88	6.00	7-34	1-35	.82	-1.08
Enmeshment[a]	139	13.80	5.05	7-27	1-35	.76	1.18
Rigidity[a]	139	17.70	5.87	7-32	1-35	.79	.69
Balanced Flexibility[a]	139	18.06	6.27	7-33	1-35	.83	.11
Chaotic[a]	139	16.02	5.24	7-28	1-35	.72	.78
Satisfaction[a]	139	31.86	10.46	10-50	1-50	.95	-.53
Communication[a]	139	31.72	9.56	10-50	1-50	.92	-.32
BDI-II	131	15.18	9.59	0-42	1-63	.89	1.01
IES-R	119	38.20	16.24	0-75	1-75	.86	-.17
Substance Using Peers	134	9.45	3.87	0-21	0-21	.82	.25
Face Valid Alcohol[b]	139	9.49	6.35	0-26	1-36	.85	.91
Face Valid Drug [b]	139	24.63	11.10	0-47	1-48	.91	.06
Family Friend [b]	122	3.85	1.40	0-7	0-9	.39	-1.58
Attitudes [b]	123	4.58	2.57	0-10	0-10	.76	.99
Symptoms[b]	123	4.50	1.45	0-7	0-9	.52	-5.02
Obvious Attributes[b]	123	6.90	1.48	3-9	0-11	.44	-2.82
Subtle Attributes [b]	122	5.28	2.11	1-11	0-12	.50	.42
Defensiveness [b]	123	3.09	1.63	0-8	0-10	.65	.88

[a]FACES-IV: Family Adaptability and Cohesion Evaluation Scale-IV
[b]SASSI-A2: Substance Abuse Subtle Screening Inventory-Adolescent Version;

Table 3

*SASSI-A2 Decision Rules to Determine if a SUD is Likely Present**

Rule 1: FVA or FVOD 12 or more?	Y	N
Rule 2: FRISK 5 or more?	Y	N
Rule 3: SYM 5 or more?	Y	N
Rule 4: SAT 9 or more?	Y	N
Rule 5: OAT 4 or more AND		
DEF 10 or more?	Y	N
Rule 6: OAT 7 or more AND		
SAT 6 or more AND		
DEF 2 or more AND		
SAM 4 or more?	Y	N
Rule 7: FVA or FVOD 7 or more AND		
FRISK or ATT or SYM 3 or more AND		
OAT 5 or more?	Y	N
Rule 8: FVA or FVOD 5 or more AND		
OAT 4 or more AND		
DEF 7 or more?	Y	N
Rule 9: FVA or FVOD 5 or more AND		
SAT 3 or more AND		
DEF 4 or more AND		
SAM 3 or more?	Y	N

*A profile that meets the cut-off for any of the 9 rules is considered to be indicative of a high probability of a SUD.

Table 4

Comparison between Current Sample and Comparison Sample on FACES-IV

Scale (7 items)	N	M	SD	Variance	Percentile	t-score	df*[a]	p-value	Cohen's *d*
Disengaged									
Comparison Sample*	467	13.2	5.67	32.2	18th	-6.58	223	<.01	.64
Current Sample	139	16.79	5.58	31.2	32th				
Cohesion									
Comparison Sample	467	27.0	6.0	36.0	50th	7.11	226	<.01	.69
Current Sample	139	22.88	6.0	36.0	25th				
Enmeshment									
Comparison Sample	467	10.8	4.0	16.0	14th	-6.45	281	<.01	.66
Current Sample	139	13.80	5.03	25.3	20th				
Rigidity									
Comparison Sample	467	16.4	5.52	30.5	26th	-2.40	238	<.05	.23
Current Sample	139	17.70	5.88	34.6	32nd				
Flexibility									
Comparison Sample	467	20.5	5.39	29.1	40th	-4.15	202	<.01	.42

Current Sample	139	18.06	6.27	39.3	25th				
Chaotic									
Comparison Sample	467	13.1	5.37	28.8	18th	-5.73	222	<.01	.55
Current Sample	139	16.02	5.24	27.5	26th				

*Comparison sample composed of 467 college students and community adults (Gorall, 2002)
*[a]df is pooled

Table 5

Description of SASSI-A2 Subscales

SASSI-A2 Subscales	Abbreviation	Purpose
Direct Scales		
Face-valid alcohol	FVA	"Acknowledged use of alcohol"
Face-valid other drug	FVOD	"Acknowledged use of other drugs"
Indirect Scales		
Family Friends Risk	FRISK	"Extent to which the client is part of a family/social system that is likely to enable substance misuse"
Attitudes	ATT	"Client's attitudes and beliefs regarding substance use"
Symptoms	SYM	"Causes, consequences of substance misuse"
Obvious attributes	OAT	"Characteristics commonly associated with substance misuse"
Subtle attributes	SAT	"Basic personal style similar to substance dependent people"
Validity Scales		
Defensiveness	DEF	"Defensiveness that may or may not be related to substance misuse and that may reflect either an enduring character trait or a temporary reaction to a current situation"

Feldstein & Miller, 2007, p. 43

Table 6

Differences among Means of SASSI-A2 Scales based on Substance Use Severity Group

Scale/Group	μ_1	μ_2	$\mu_1 - \mu_2$	F-Value	*p*	df_{bt}	df_{wi}
Face Valid Alcohol Use				145.73	<.001**	2	136
Low vs. Mod	4.21	6.45	-2.24		.05		
Low vs. High	4.21	17.18	-12.97		<.001** [a]		
Mod vs. High	6.45	17.18	-10.73		<.001** [a]		
Face Valid Drug Use				53.12	<.001**	2	136
Low vs. Mod	7.90	23.83	-15.93		<.001** [a]		
Low vs. High	7.90	32.30	-24.40		<.001** [a]		
Mod vs. High	23.83	32.30	-8.47		<.001** [a]		
Family-Friend Risk				7.52	.001**	2	119
Low vs. Mod	.73	3.87	-1.15		<.01* [a]		
Low vs. High	2.73	4.25	-1.53		.001** [a]		
Mod vs. High	3.87	4.25	-0.38		.33		
Attitudes				9.46	<.001**	2	120
Low vs. Mod	3.61	4.01	-.40		.82		
Low vs. High	3.61	5.93	-2.32		<.01*[a]		
Mod vs. High	4.01	5.93	-1.92		<.001** [a]		
Symptoms				13.47	<.001**	2	120
Low vs. Mod	2.98	4.57	-1.59		<.001** [a]		
Low vs. High	2.98	5.00	-2.02		<.001** [a]		
Mod vs. High	4.57	5.00	-0.44		.23		
Obvious Attributes				4.84	<.01**	2	120
Low vs. Mod	6.41	6.68	-0.27		.78		
Low vs. High	6.41	7.47	-1.06		.04		
Mod vs. High	6.68	7.47	-0.79		.02		

Subtle Attributes				7.44	.001**	2	119
Low vs. Mod	4.51	4.87	-0.36		.80		
Low vs. High	4.51	6.27	-1.76		.01*		
Mod vs. High	4.87	6.27	-1.40		.002**		
Defensiveness				4.96	.01*	2	120
Low vs. Mod	4.22	2.98	1.24*		.02*		
Low vs. High	4.22	2.79	1.44**		<.01*		
Mod vs. High	2.98	2.79	0.19		.82		

Omnibus tests: * p<.05, two tailed. **p<.01, two tailed.
A bonferoni adjustment was made for the pairwise comparisons: * ^{a}p<..017, two tailed. **^{a}p<..003, two tailed.

Table 7

Bivariate Correlations of Variables included in Multinomial Logistic Regression Analysis

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Disengaged	__															
2. Enmeshed	.19*	__														
3. Rigid	.22*	.36**	__													
4. Chaotic	.49**	.54**	.10	__												
5. Coh level: Dis vs Bal	-.37**	.30**	.12	-.05	__											
6. Flex level: Rig vs Bal	.02	.45**	-.09	.26**	.35**	__										
7. Overall Level: Bal vs Mid	.08	-.13	-.03	<.01	-.64**	-.49**	__									
8. Overall Level: Bal vs Ext	.23*	-.48**	-.03	-.19	-.99**	-.98**	NA	__								
9. Overall Level: Mid vs Ext	.14	-.42**	<.01	-.22	-.53**	-.64**	NA	NA	__							
10. BDI-II	-.80	.04	-.03	.04	-.14	.01	-.11	.08	.19	__						
11. IES-R	-.15	.06	-.02	-.06	.09	-.16	-.10	.02	.11	.28**	__					
12. Peer Sub Use	.05	-.19*	-.23**	-.02	-.18*	-.07	.01	.15	.16	.05	<.01	__				
13. Family Sub Abuse	.12	.03	-.05	.12	-.15	-.14	.06	.19	.15	.07	.02	.12	__			
14. Low vs Mod Severity	-.08	-.06	-.25*	-.10	.14	-.04	-.90	-.10	-.01	.12	.30**	.24*	.35**	__		
15. Low vs High Severity	-.09	-.22	-.27*	-.13	-.03	-.17	-.05	.06	.11	.14	.32*	.50*	.35**	NA	__	
16. Mod vs High Severity	<.01	-.17	-.01	-.02	-.19*	-.14	.07	.19	.13	.12	.04	.30**	-.03	NA	NA	_

*$p < .05$; ** $p < .01$

Table 8

Multinomial Logistic Regression Analyses for Variables Related to Substance Use Severity Group (N=105)

	Low Severity vs. Moderate Severity				*Low Severity vs. High Severity*				*Moderate Severity vs. High Severity*						
	B	*SE B*	*Wald*	*OR*	*B*	*SE B*	*Wald*	*OR*	*B*	*SE B*	*Wald*	*OR*	ΔX^2	*p*	ΔR^2
Block 1													37.05	<.001	.34
IES-R	.05	.02	5.52*	1.05	.05	.02	5.65*	1.06	.01	.02	.10	1.01	7.15	.03	
Peer sub use	.12	.10	1.45	1.13	.33	.11	9.20**	1.39	.21	.07	9.58**	1.24	16.44	<.01	
Fam sub abuse[a]	2.37	.77	9.42**	10.64	-1.62	.80	4.07*	.20	.75	.63	1.41	2.11	10.24	.01	
Block 2													6.51	.05	.05
IES-R	.06	.03	5.42*	1.06	.06	.03	5.94*	1.06	.01	.02	.17	1.01	7.56	.02	
Peer sub use	.16	.10	2.47	.12	.35	.11	9.88**	1.42	.19	.07	7.44**	1.21	15.09	.001	
Fam sub abuse[a]	2.86	.88	10.61**	17.54	1.96	.90	4.77*	7.09	-.91	.65	1.94	.40	12.73	<.01	
Coh Level[b]	1.71	.87	3.90*	5.56	.74	.88	.71	2.11	-.97	.49	3.86*	.38	6.51	.04	

* p<.05, two tailed. **p<.01, two tailed.

[a] Family Member Substance Abuse is coded as "0" = No family member substance abuse; "1" = Family member substance abuse

[b] Cohesion Level is coded as "0" =disengaged level of cohesion; "1" = balanced cohesion

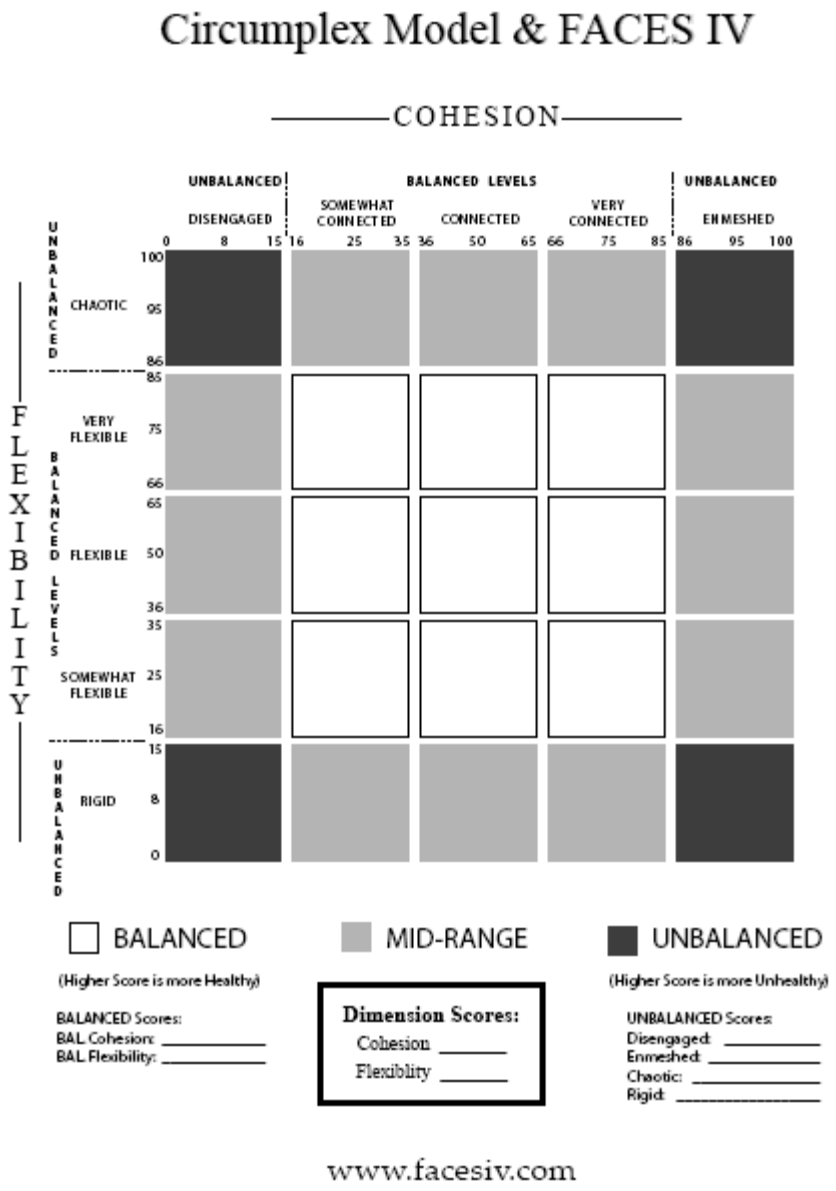

Figure 1

Circumplex Model & FACES-IV (Olson & Gorall, 2006)

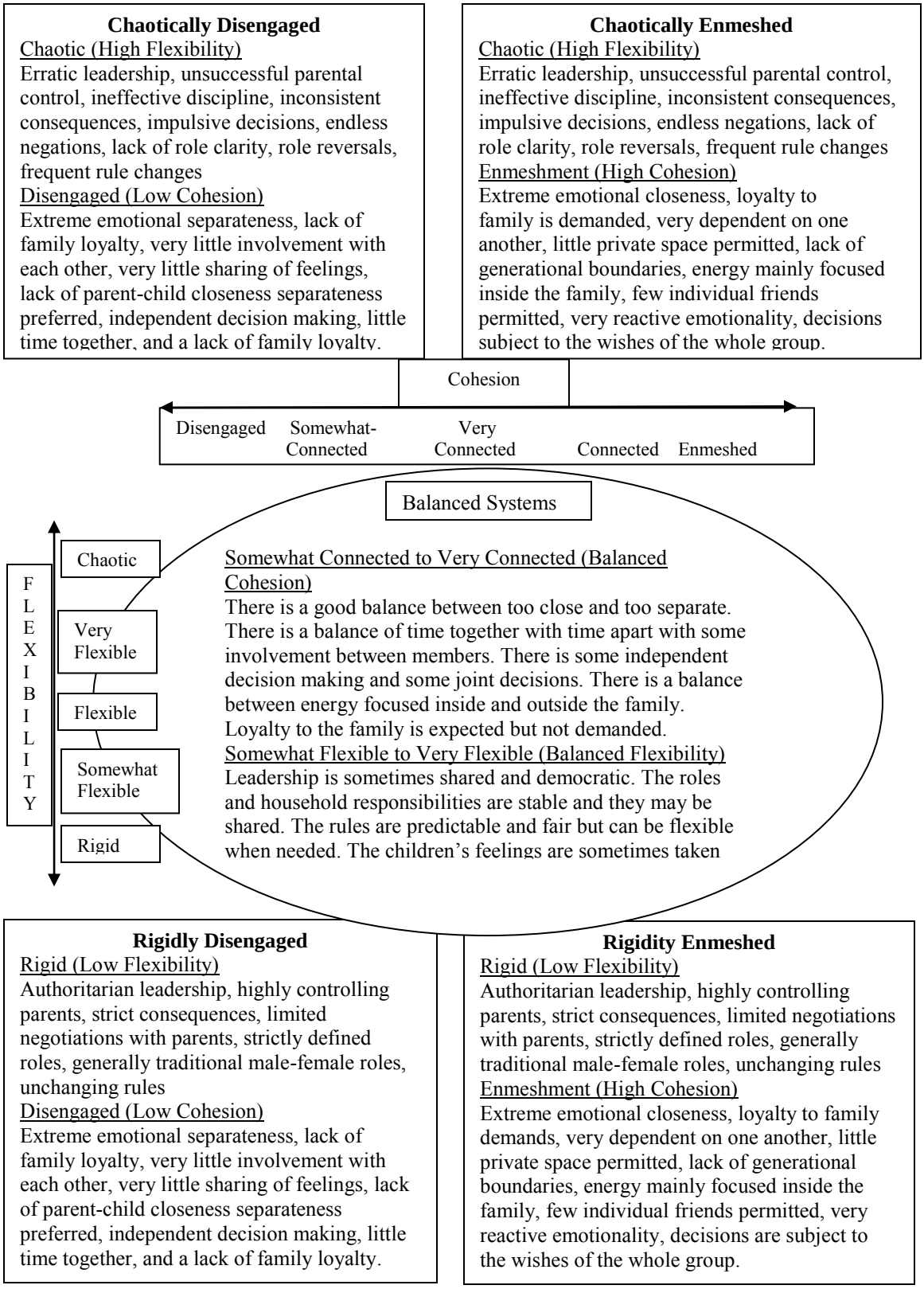

Figure 2

Descriptions of Extreme Family Functioning Patterns (Olson, 1989)

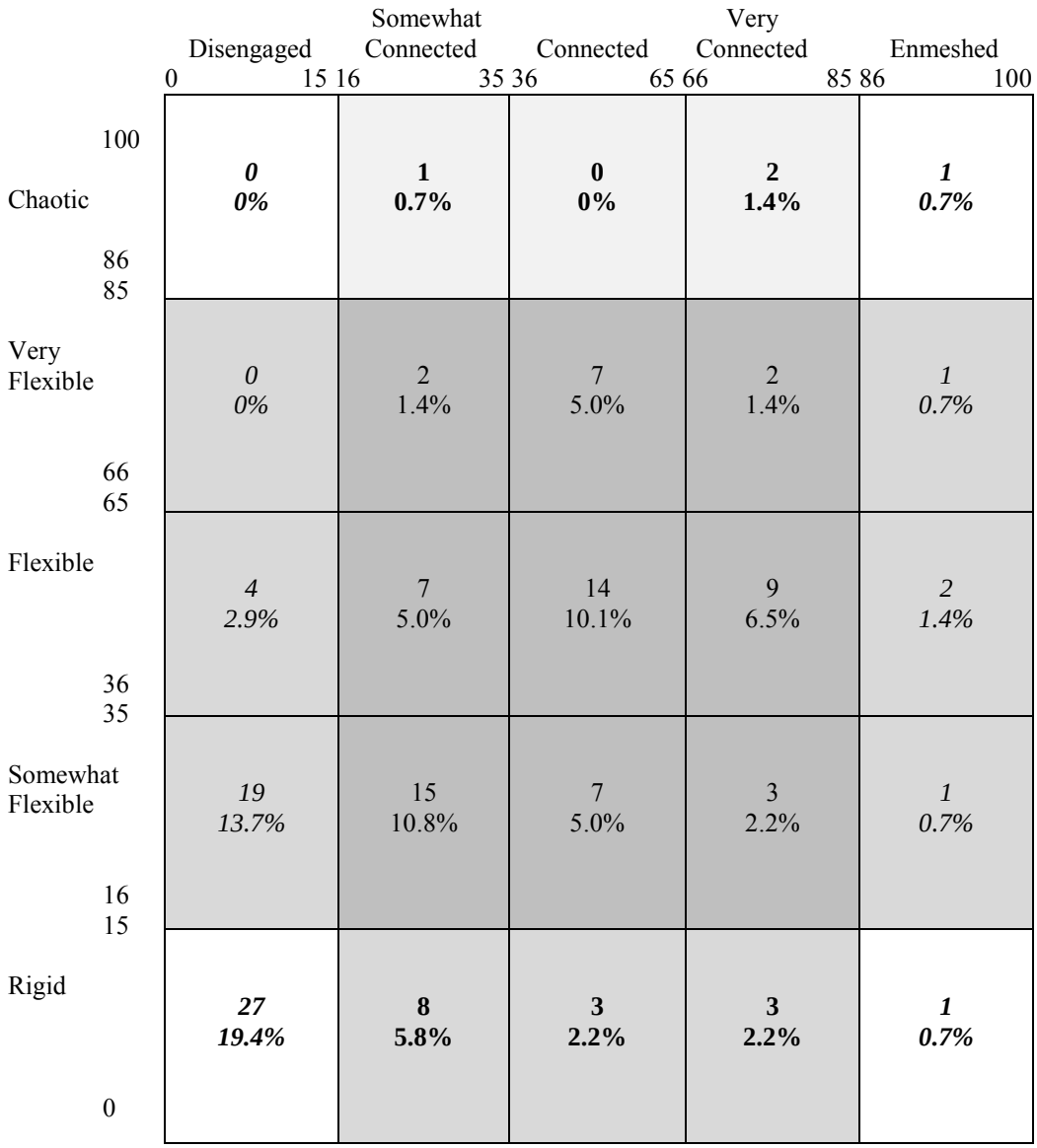

Figure 3

Distribution of family functioning on the Circumplex Map in the current study

Key:
Dark grey indicates extreme functioning
Light grey indicates mid-range functioning
White indicates extreme functioning
Italicized writing indicates problematically low or high cohesion (i.e. disengaged or enmeshed)
Bold writing indicates problematically low or high flexibility (i.e. rigid or chaotic)
Italicized, bold writing indicates problematically low or high cohesion and flexibility

Appendix A: Study Measures

A1. Demographics (from Solutions for Ohio's quality improvement and compliance assessment form

A2. Family Adaptability and Cohesion Scale – IV (FACES-IV)

A3. Impact of Event Scale-Revised (IES-R)

A4. The American Drug and Alcohol Survey (ADAS)

A5. Beck Depression Inventory-II (BDI-II)

A6. Substance Use Subtle Screening Inventory – Adolescent version – 2 (SASSI-A2)

A1:
Solutions for Ohio's Quality Improvement and Compliance Form (SOQIC)

1. Gender

☐ Male

☐ Female

2. Age

☐ 12 ☐ 16

☐ 13 ☐ 17

☐ 14 ☐ 18

☐ 15

3. Race/ethnicity

☐ White/Non-Hispanic

☐ Hispanic/Latino

☐ African-American/Non-Hispanic

☐ African-American/Hispanic

☐ Asian or Pacific Islander

☐ Native American

☐ Mixed

☐ Other: _____ (Specify)

5. Level of Highest Education in Primary Household:

☐ Less than High School Degree

☐ High School Degree

☐ Some College/Associates or Trade School Degree

☐ Bachelor's Degree

☐ Graduate Degree

6. Whom has primary custody?

☐ Mother

☐ Father

☐ Both Parents

☐ Other

7. Has the individual received previous AOD treatment?

☐ Yes ☐ No

8. Does a family member in the primary household abuse drugs or alcohol?

☐ Yes ☐ No

9. Is the individual court ordered to treatment?

☐ Yes ☐ No

A2:
Family Adaptability and Cohesion Evaluation Scale-IV (FACES-IV)
Directions: *Circle the corresponding* ***number*** *in the space provided next to the statement.*

1	2	3	4	5
DOES NOT describe our family well	SLIGHTLY describes our family	SOMEWHAT describes our family	GENERALLY describes our family	VERY WELL describes our family

1. Family members are involved in each other's lives. 1 2 3 4 5
2. Our family tries new ways of dealing with problems. 1 2 3 4 5
3. We get along better with people outside our family than inside. 1 2 3 4 5
4. We spend too much time together. 1 2 3 4 5
5. There are strict consequences for breaking the rules in our family. 1 2 3 4 5
6. We never seem to get organized in our family. 1 2 3 4 5
7. Family members feel very close to each other. 1 2 3 4 5
8. The parents check with the children before making important decision. 1 2 3 4 5
9. Family members seem to avoid contact with each other when at home. 1 2 3 4 5
10. Family members feel pressured to spend most free time together. 1 2 3 4 5
11. There are severe consequences when a family member does something wrong. 1 2 3 4 5
12. We need more rules in our family. 1 2 3 4 5
13. Family members are supportive of each other during difficult times. 1 2 3 4 5
14. Children have a say in their discipline. 1 2 3 4 5
15. Family members feel closer to people outside the family than to other family members. 1 2 3 4 5
16. Family members are too dependent on each other. 1 2 3 4 5
17. This family has a rule for almost every possible situation. 1 2 3 4 5
18. Things do not get done in our family. 1 2 3 4 5
19. Family members consult other family members on personal decisions. 1 2 3 4 5
20. In solving problems, the children's suggestions are followed. 1 2 3 4 5
21. Family members are on their own when there is a problem to be solved. 1 2 3 4 5
22. Family members have little need for friends outside the family. 1 2 3 4 5
23. It is difficult to get a rule changed in our family. 1 2 3 4 5
24. It is unclear who is responsible for things (chores, activities) in our family. 1 2 3 4 5
25. Family members like to spend some of their free time with each other. 1 2 3 4 5
26. We shift household responsibilities from person to person. 1 2 3 4 5
27. This family doesn't do things together. 1 2 3 4 5
28. We feel too connected to each other. 1 2 3 4 5

29. Once a task is assigned to a member, there is little chance of changing it. 1 2 3 4 5
30. There is no leadership in this family. 1 2 3 4 5
31. Although family members have individual interests, the still participate in family activities. 1 2 3 4 5
32. Family members make the rules together. 1 2 3 4 5
33. Family members rarely depend on each other. 1 2 3 4 5
34. We resent family members doing things outside the family. 1 2 3 4 5
35. It is important to follow the rules in our family. 1 2 3 4 5
36. No one in this family seems to be able to keep track of what their duties are. 1 2 3 4 5
37. This family has a good balance of separateness and closeness. 1 2 3 4 5
38. When problems arise, we compromise. 1 2 3 4 5
39. Family members know very little about the friends of other family members. 1 2 3 4 5
40. Family members feel guilty if they want to spend time away from the family. 1 2 3 4 5
41. Family members feel they have to go along with what the family decides to do. 1 2 3 4 5
42. It's hard to know who the leader is in the family. 1 2 3 4 5
43. Family members are satisfied with how they communicate with each other. 1 2 3 4 5
44. Family members are very good listeners. 1 2 3 4 5
45. Family members express affection to each other. 1 2 3 4 5
46. Family members are able to ask each other for what they want. 1 2 3 4 5
47. Family members can calmly discuss problems with each other. 1 2 3 4 5
48. Family members discuss their ideas and beliefs with each other. 1 2 3 4 5
49. When family members ask questions of each other, they get honest answers. 1 2 3 4 5
50. Family members try to understand each other's feelings. 1 2 3 4 5
51. When angry, family members seldom say negative things about each other. 1 2 3 4 5
52. Family members express their true feelings to each other. 1 2 3 4 5

1	2	3	4	5
DOES NOT describe our family well	SLIGHTLY describes our family	SOMEWHAT describes our family	GENERALLY describes our family	VERY WELL describes our family

How satisfied are you with these aspects of your family relationship?

53. The degree of closeness between family members? 1 2 3 4 5

54. Your family's ability to cope with stress?	1 2 3 4 5
55. Your family's ability to be flexible.	1 2 3 4 5
56. Your family's ability to share positive experiences.	1 2 3 4 5
57. The quality of communication between family members.	1 2 3 4 5
58. Your family's ability to resolve conflicts.	1 2 3 4 5
59. The amount of time you spend together as a family.	1 2 3 4 5
60. The way problems are discussed.	1 2 3 4 5
61. The fairness of criticism in your family.	1 2 3 4 5
62. Family members concern for each other.	1 2 3 4 5

A3:
Impact of Event Scale-Revised (IES-R)

Below is a list of comments made by people after stressful life events. Please mark each item, indicating how frequently these comments were true for you DURING THE PAST 7 DAYS. If they did not occur during that time, please mark that item "0 = Not at all."

0 = Not at all
1= Rarely
3 = Sometimes
5 = Often

____ 1. I thought about it when I didn't mean to.

____ 2. I avoided letting myself get upset when I thought about it or was reminded of it.

____ 3. I tried to remove it from my memory.

____ 4. I had trouble falling asleep or staying asleep, because of pictures or thoughts that came into my mind.

____ 5. I had waves of strong feelings about it.

____ 6. I had dreams about it.

____ 7. I stayed away from reminders of it.

____ 8. I felt as if it hadn't happened or wasn't real.

____ 9. I tried not to talk about it.

____ 10. Pictures of it popped into my mind.

____ 11. Other things kept making me think about it.

____ 12. I was aware that I still had a lot of feelings about it, but I didn't deal with it.

____ 13. I tried not to think about it.

____ 14. Any reminder brought back feelings about it.

____ 15. My feelings about it were kind of numb.

A4:
The American Drug and Alcohol Survey (ADAS)

How many of your friends do each of the following?

	None	A few	Most of them	All of them
Get drunk				
Use marijuana				
Use cocaine				
"Sniff" glue, gasoline, etc.				
Use meth, spend crank				
Use narcotic painkillers				
Smoke cigarettes				

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A6:
Substance Abuse Subtle Screening Inventory-Adolescent Version-2 (SASSI-A2)

0	1	2	3
Never	Once or Twice	Several Times	Repeatedly

Alcohol (FVA)

1. Drank Alcohol during the day?	0 1 2 3
2. Taken a drink or drinks to help you talk about your feelings and ideas?	0 1 2 3
3. Taken a drink or drinks so you wouldn't feel tired?	0 1 2 3
4. Had more to drink that you intended to?	0 1 2 3
5. Gotten sick from drinking (e.g., vomiting, dizziness, headache)?	0 1 2 3
6. Gotten into trouble in school, at home, on the job, or with the police because of your drinking?	0 1 2 3
7. Become very sad or felt "down" after having sobered up?	0 1 2 3
8. Argued with your family or friends because of your drinking?	0 1 2 3
9. Had a strange experience when drinking (such as seeing something not really there) that came back again when you hadn't been drinking for a while?	0 1 2 3
10. Lost friends because of your drinking?	0 1 2 3
11. Felt really nervous or shaky after having sobered up?	0 1 2 3
12. Tried to kill yourself while drunk?	0 1 2 3

Other Drugs (FVOD)*
**Does not include proper use of medications prescribed for you*

1. Taken drugs to improve your thinking and feeling?	0 1 2 3
2. Taken drugs to help you feel better about a problem?	0 1 2 3
3. Taken drugs to be more aware of your senses (e.g., sight, hearing, touch, etc.)?	0 1 2 3
4. Taken drugs so you could enjoy sex more?	0 1 2 3
5. Taken drugs to help forget about feelings of being helpless or worthless?	0 1 2 3
6. Taken drugs to forget school, work, or family pressures?	0 1 2 3
7. Gotten into trouble in school, at home, on the job, or with the police because of your drug use?	0 1 2 3
8. Gotten really stoned or wiped out on drugs (more than just high)?	0 1 2 3
9. Tried to talk a doctor into giving you some prescription drug (e.g., tranquilizers, pain killers, diet pills)?	0 1 2 3
10. Spent your spare time in buying, selling, taking or talking about drugs?	0 1 2 3

11. Used alcohol and other drugs at the same time?	0 1 2 3
12. Continued to take a drug or drugs so you wouldn't feel physically uncomfortable or even sick from not having the drug(s)?	0 1 2 3
13. Felt your drug use has kept you from getting what you want out of life?	0 1 2 3
14. Been accepted into a treatment program because of your drug use?	0 1 2 3
15. Gone to school after drinking or using drugs?	0 1 2 3
16. Drank or used drugs away from home?	0 1 2 3

If a statement is MOSTLY TRUE for you, fill in the box in the column headed "T".
If a statement is MOSTLY FALSE for you, fill in the box in the column headed "T".

1. T	F	People will probably succeed if they work hard.
2. T	F	At least one of my parents has often been very sad, anxious, or unhappy.
3. T	F	I have never been in trouble with the principle or the police.
4. T	F	I can be friendly with people who do many wrong things.
5. T	F	I do not like to sit and daydream.
6. T	F	The school rules regarding getting caught with drugs are too strict.
7. T	F	Sometimes I have a hard time sitting still.
8. T	F	I have not lives the way I should.
9. T	F	I have had days, weeks, or months when I couldn't get much done because I just wasn't up to it.
10. T	F	I always listen carefully to people who are older than me.
11. T	F	I like to obey the rules.
12. T	F	I have often felt bad or scared because of the drinking or drug use of someone in my family.
13. T	F	Some crooks are so clever that I hope they never get caught.
14. T	F	I have never done anything dangerous just for fun.
15. T	F	I am always well behaved in school.
16. T	F	I have sometimes drunk to much beer or other alcoholic drink.
17. T	F	Sometimes I wish I had better control of how I behave and feel.
18. T	F	Adults shouldn't hassle kids so much about drugs.
19. T	F	I break more rules than most people my age.
20. T	F	Swearing and cursing have become a serious problem in our schools and must be stopped.
21. T	F	I'm friends with some people who sell drugs.
22. T	F	I'm usually happy.
23. T	F	I have been tempted to hit people.
24. T	F	I always feel sure of myself.
25. T	F	My school teachers have had some problems with me.
26. T	F	Many of my friends drink or get high regularly.
27. T	F	I have never broken an important rule.

28. T F There have been times I have done things I didn't remember later.
29. T F Getting caught drinking or using drugs is no big deal.
30. T F I think carefully about everything I do.
31. T F I have used alcohol or "pot" to much or to often.
32. T F Some of my friends have bad reputations.
33. T F I smoke cigarettes regularly.
34. T F At times I have been so full of energy that I felt I didn't need to sleep for days at a time.
35. T F Adults don't really know how much teenagers are using drugs.
36. T F I have never felt sad over anything.
37. T F I think there is something wrong with my memory.
38. T F I have neglected schoolwork because of my drinking or drug use.
39. T F I have taken a drink in the morning to steady my nerves or to get rid of a hangover.
40. T F I often daydream about things that I don't tell other people.
41. T F I have wanted to run away from home.
42. T F People who use drugs have more fun.
43. T F I like doing things with my family.
44. T F It doesn't really both me to see animals suffer.
45. T F At times I feel worn out for no particular reason.
46. T F I can see why they have laws about drugs like cocaine and heroin but outlawing marijuana is stupid.
47. T F No one has ever criticized or punished me.
48. T F I think carefully about how I dress.
49. T F My drinking or other drug use causes problems between me and my family.
50. T F I have skipped school pretty often.
51. T F Most of the people my age drink or use drugs.
52. T F Sometimes I like doing the opposite of what others want.
53. T F My parents like my friends.
54. T F In new situations I like to find out which people it would be useful to be friendly with.
55. T F One of my parents was/is a heavy drinker or drug user.
56. T F In school I have often been in trouble for misbehaving.
57. T F More often than not I have a sense that life is worthwhile.
58. T F I have used alcohol to excess.
59. T F When I'm in a group I have trouble thinking of the right things to talk about.
60. T F Drugs help people to be creative.
61. T F My grades in school are average or better.
62. T F I don't really worry about catching diseases.
63. T F Sometimes I feel that my drug use or drinking is keeping me from getting what I want out of life.
64. T F I've frequently played sick to get out of something.

65. T F I think many adults who say they are against drugs probably use some kind of drugs themselves.
66. T F My parents hardly ever know where I am.
67. T F My participation in clubs, sports, or other after school activities is important in my life.
68. T F I am often restless or jumpy.
69. T F I have sometimes just sat around when I should have been working.
70. T F The drug laws we have are stupid.
71. T F If some friends and I were in trouble together, I would rather take the whole blame that tell on them.
72. T F I can be depended on to do the things I am supposed to.

Appendix B: Supplemental Analyses

Appendix: Table B1

Differences among means of FVA and FVOD scales based on Overall Family Functioning Level (N = 139)

Variable	μ_1	μ_2	$\mu_1 - \mu_1$	*SE*	$df_{between}$	df_{within}	*F*	*P*
FVA							1.29	.28
Bal vs. Mid	9.19	8.96	.23	1.25	2	136		.98
Bal vs. Extreme	9.19	11.16	-1.98	1.39				.33
Mid vs. Extreme	8.96	11.16	-2.20	1.50				.31
FVOD					2	136	.37	.69
Bal vs. Mid	24.95	23.22	1.73	2.22				.72
Bal vs. Extreme	24.95	25.11	-.17	2.47				>.99
Mid vs. Extreme	23.22	25.11	-1.89	2.66				.76

* p<.05, two tailed. **p<.01, two tailed.
$N_{balanced}$=65
$N_{midrange}$=43
$N_{extreme}$=31

Appendix: Table B2

Differences among means of FVA and FVOD scales based on extreme pattern of functioning

(N = 84)[*a]

Variable	μ_1	μ_2	$\mu_1 - \mu_1$	*SE*	$df_{between}$	df_{within}	*F*	*p-value*
FVA					3	81	0.35	.79
RigDis vs. RigEnm	9.58	9.71	-.14	2.46				.87
RigDis vs. ChaDis	9.58	12.33	-2.76	3.66				.88
RigDis vs. ChaEnm	9.58	11.50	-1.92	2.64				>.99
RigEnm vs. ChaDis	9.71	12.33	-2.62	4.29				.93
RigEnm vs. ChaEnm	9.71	11.50	-1.79	3.46				.96
ChaDis vs. ChaEnm	12.33	11.50	.83	4.39				>.99
FVOD					3	81	1.64	.19
RigDis vs. RigEnm	23.22	22.57	.65	4.52				>.99
RigDis vs. ChaDis	23.22	16.67	6.55	6.72				.76
RigDis vs. ChaEnm	23.22	32.50	-9.28	4.85				.23
RigEnm vs. ChaDis	22.57	16.67	5.90	7.86				.88
RigEnm vs. ChaEnm	22.57	32.50	-9.92	6.34				.40
ChaDis vs. ChaEnm	16.67	32.50	-15.83	8.06				.21

* p<.05, two tailed. **p<.01, two tailed.

[*a]= moderate levels of each of the problematic family types were combined with the extreme family types due to small sample size in several of the extreme types

$N_{rigidly\text{-}disengaged}$=69 (4)

$N_{rigidly\text{-}enmeshed}$=7 (3)

$N_{chaotically\text{-}disengaged}$=3 (1)

$N_{chaotically\text{-}enmeshed}$=6 (2)

Appendix: Table B3

Comparisons of Cohesion and Flexibility Means for current and past samples assessed using the FACES-II

Scale	FACES Version	Sample	Number of Items	Age	Mean	Equivalent means
Balanced Cohesion*	**IV**	**Current Sample**	**7**	**16.24**	**22.99**	**22.99**
	II	Adolescent with SUDs prior to treatment*[a]	16	13.20	56.4	24.68
	II	Adolescent with SUDs after Treatment*[a]	16	15.20	51.1	22.36
	II	Adolescent Repeat Offenders*[b]	16	14.8	49.8	21.79
Balanced Flexibility*	**IV**	**Current Sample**	**7**	**16.24**	**18.07**	**18.07**
	II	Clinical Before treatment*[a]	14	13.20	47.3	23.65
	II	Clinical After Treatment*[a]	14	15.20	43.1	21.55
	II	Adolescent Repeat Offenders*[b]	14	14.8	41.3	20.65

* = higher scores indicate healthier functioning

[a] = n=25 Adolescents who received substance use treatment during the course of a two-year longitudinal study, functioning was assessed at the onset of the study and two years later (Needle et al., 1988)

*[b] = n=51 Adolescent repeat offenders (Henggeler, Burr-Harris, Borduin & McCallum, 1991)

Appendix: Table B4

Comparison of Cohesion Levels based on FACES-III cut-off points[*]

Comparison Group	π_1	π_2	N_1	N_2	z-score	p-value
Very Separated						
Current vs. Outpatient Sample[*a]	43.2	60.1	139	148	-2.76	<.01
Current vs. Normative Sample[*b]	43.2	18	139	421	5.83	<.01
Separated						
Current vs. Outpatient Sample	33.8	24.4	139	148	1.74	>.05
Current vs. Normative Sample	33.8	32	139	421	.03	>.05
Connected						
Current vs. Outpatient Sample	18.7	12.8	139	148	1.21	>.05
Current vs. Normative Sample	18.7	30	139	421	-2.42	>.05
Very Connected						
Current vs. Outpatient Sample	4.3	2.7	139	148	.13	>.05
Current vs. Normative Sample	4.3	20	139	421	-4.32	<.01

[*]: Calculated based on the FACES-III cut-off point for families with adolescents, and comparable cut-offs were computed for the current sample based on scores on the Balanced Cohesion and Balanced Flexibility Scales only

[*a]=Sample of 148 adolescents receiving outpatient substance use treatment (Volk et al., 1989)

[*b] =Sample of 421 non-problematic adolescents used in establishing norms for the FACES-III (Olson, 1989)

Appendix: Table B5

Comparison of Flexibility Levels based on FACES-III cut-off points[*]

Comparison Group	π_1	π_2	N_1	N_2	z-score	p-value
Very Structured						
Current vs. Outpatient Sample[*a]	21.6	25.4	139	148	-0.46	>.05
Current vs. Normative Sample[*b]	21.6	14	139	421	2.09	<.05
Structured						
Current vs. Outpatient Sample	27.3	31.1	139	148	-.62	>.05
Current vs. Normative Sample	27.3	36	139	421	-1.84	>.05
Flexible						
Current vs. Outpatient Sample	14.4	29.7	139	148	-3.13	<.01
Current vs. Normative Sample	14.4	29	139	421	-3.42	<.01
Very Flexible						
Current vs. Outpatient Sample	36.7	13.5	139	148	4.28	<.01
Current vs. Normative Sample	36.7	21	139	421	3.67	<.01

[*]: Calculated based on the FACES-III range for families with adolescents, and computed for current sample based on Balanced Cohesion and Balanced Flexibility Scales only
[*a]=Sample of 148 adolescents receiving outpatient substance use treatment (Volk et al., 1989)
[*b] =Sample of 421 non-problematic adolescents used in establishing norms for the FACES-III (Olson, 1989)

Appendix: Table B6

Comparison between "soft" vs. "hard" substance use and overall family functioning level

		Overall Group			
		Balanced	Midrange	Extreme	Total
Type of Substance:					
Soft	N	43	32	18	93
	% of Total	31.6%	23.5%	13.2%	68.4%
Hard	N	21	11	11	43
	% of Total	15.4%	8.1%	8.1%	31.6%
Total	N	64	43	29	136
	% of Total	47.1%	31.6%	21.3%	100.0%

$X^2(2, N=136)=1.30, p=.52$

Comparison between "soft" vs. "hard" substance use and extreme family functioning pattern

		Overall Group				
		Rig-Dis	Rig-Enm	Cha-Dis	Cha-Enm	Total
Type of Substance:						
Soft	N	45	5	3	4	57
	% of Total	54.9%	6.1%	3.7%	4.9%	69.5%
Hard	N	21	1	0	2	25
	% of Total	26.8%	1.2%	0%	2.5%	30.5%
	Total N	67	6	3	6	82
	% of Total	81.7%	7.3%	3.7%	7.3%	100%

$X^2(3, N=82)=2.05, p=.56$

Appendix: Table B7

Categorical Variables and Overall Family Functioning Level

	Total N	Balanced	Midrange	Extreme	X^2	P value
Gender	138				0.52	.77
Male		42	32	19		
Female		21	13	11		
Race	138				4.19	.12
Caucasian		59	38	29		
Other		4	7	1		
Custody[a]	134				1.52	.82
Mother		34	23	13		
Both Parents		12	7	5		
Other		16	5	11		
Highest level of education in primary household[b]	118				0.11	.95
Some High School/GED/HS Diploma		30	18	15		
Some College/Trade School or Higher		26	17	12		
Court Ordered to Tx[c]	115				0.94	.62
No		21	16	13		
Yes		30	23	12		
Previous SU Tx[d]	134				.84	.66
No		14	12	9		
Yes		48	31	20		
Family Member	131				3.10	.21
Substance Abuse[e]						

No	16	9	3
Yes	44	33	26

* p<.05, two tailed. **p<.01, two tailed.

Appendix: Table B8

Differences among means of continuous variables based on Overall Family Functioning Level (Balanced, Mid-Range and Extreme)

Scale/Group	μ_1	μ_2	$\mu_1 - \mu_2$	F-Value	*p-value*	df_{bt}	df_{wi}
Age				.61	.55	2	135
Bal vs. Mid	6.33	6.11	.22		.51		
Bal vs. Ext	6.33	6.23	.10		.90		
Mid vs. Ext	6.11	6.23	-.12		.87		
IES-R				0.67	.51	2	116
Bal vs. Mid	39.25	35.79	3.46		.56		
Bal vs. Ext	39.25	39.83	-0.57		.99		
Mid vs. Ext	35.79	39.83	-4.04		.61		
BDI-II				1.47	.23		
Bal vs. Mid	15.51	13.37	2.14		.51		
Bal vs. Ext	15.51	17.29	-1.78		.70		
Mid vs. Ext	13.37	17.29	-3.91		.22		
Substance Using Peers				1.02	.36	2	130
Bal vs. Mid	9.16	9.20	-.04		.99		
Bal vs. Ext	9.16	10.35	-1.19		.37		
Mid vs. Ext	9.20	10.35	-1.15		.44		

* p<.05, two tailed. **p<.01, two tailed.

Appendix: Table B9

Differences among means of continuous variables based on "soft" versus "hard" Primary Substance of Choice

Scale/Group	μ_1	μ_2	$\mu_1 - \mu_2$	t-value	*P*	df_{bt}
Disengagement	17.02	16.18	.84	.81	.42	133
Balanced Cohesion	23.18	22.42	.76	.69	.49	133
Enmeshment	14.38	12.61	1.78	.29	.77	133
Rigidity	18.60	15.98	2.62	2.43	.02	133
Balanced Flexibility	18.32	17.99	.33	.29	.77	133
Chaotic	16.36	15.24	1.12	1.14	.26	133
Communication	31.80	32.23	-.44	-.25	.81	133
Satisfaction	32.31	31.36	.95	.49	.62	133
Age	6.05	6.56	-.50	-2.72	.01	133
IES-R	38.79	38.99	-.20	-.06	.95	114
BDI-II	13.74	18.43	-4.69	-2.63	.01	125
Association with Substance Using Peers	8.57	11.24	-2.67	-3.80	<.001	129

* p<.05, two tailed. **p<.01, two tailed.

Appendix: Table B10

Categorical Variables and Primary Substance of Choice

	"Soft"	"Hard"	X^2
Cohesion Level			0.433
Disengaged	33	15	
Balanced	56	25	
Enmeshed	4	3	
Flexibility Level			2.186
Rigid	29	16	
Balanced	50	27	
Chaotic	4	0	
Overall Group			1.302
Balanced	43	21	
Midrange	32	11	
Extreme	18	11	
Gender			17.824**
Male	73	18	
Female	20	25	
Race			3.300
Caucasian	82	42	
Other	11	1	
Custody[a]			2.250
Mother	51	19	
Both Parents	16	7	
Other	23	16	
Highest level of educ house[b]			0.40
Some H.S./GED/HS Diploma	39	23	

Some Col/Trade Sch or more	37	17	
Court Ordered to Tx[c]			3.203
No	31	19	
Yes	51	15	
Previous SU Tx[d]			0.681
No	22	13	
Yes	69	29	
Family Member Sub Abuse[e]			2.017
No	22	6	
Yes	65	36	

* p<.05, two tailed. **p<.01, two tailed.
[a]Due to missing data N= 133
[b]Due to missing data N=117
[c]Due to missing data N= 116
[d]Due to missing data N=132
[e]Due to missing data N=129

Appendix: Table B11

Binary Logistic Regression Analyses for family functioning variables related to "Hard" versus "Soft" primary substance use (N = 126)

Variable	*B*	*SE*	*Wald* X^2	*OR*	X^2	*p*	R^2
Model 1					7.59	.27	.08
Disengaged	.03	.05	.39	1.03	.53		
Enmeshment	-.02	.06	.13	.98	.72		
Rigid	-.08	.04	3.99*	.92	.05		
Chaotic	-.02	.05	.15	.70	.98		
Cohesion Level	.42	.51	.67	1.52	.42		
Flexibility Level	-.46	.51	.83	.63	.36		
Final Model					5.93	.02	.06
Rigidity	-.08	.03	5.50*				

* p<.05, two tailed. **p<.01, two tailed.

Appendix: Table B12

Binary Logistic Regression Analyses for Variables Related to "Hard" vs. "Soft" Primary Substance Use (N = 101)

Variable	*B*	*SE*	*Wald* X^2	*OR*	X^2	*p*	R^2
Final Model					28.94	<.001	.36
Age	.64	.29	4.78*	1.89	.03		
Gender	-1.94	.56	12.04**	.14	<.01		
Sub Using Peers	.26	.08	9.78**	1.89	<.01		

* p<.05, two tailed. **p<.01, two tailed.

Appendix: Table B13

Multinomial Logistic Regression Analysis for Family Functioning Variables Related to Substance Use Severity Group (N=129)

	Low vs Moderate Severity				*Low vs High Severity*				*Moderate vs High Severity*						
Variable	*B*	*SE B*	*Wald*	*OR*	*B*	*SE B*	*OR*	*Wald*	*B*	*SE B*	*Wald*	*OR*	X^2	*p-value*	R^2
Model 1													19.18	.08	.16
Disengagement	.12	.08	2.22	1.12	.06	.08	1.06	.61	-.05	.05	1.29	.95	3.00	.22	
Enmeshment	.08	.09	.77	1.08	.02	.09	1.02	.03	-.06	.06	1.05	.94	1.46	.48	
Rigidity	-.20	.07	8.37*	.82	-.17	.07	.85	5.82*	.03	.04	.04	1.03	9.84	.01	
Chaotic	-.09	.08	1.18	.92	-.03	.08	.97	.16	.05	.05	.05	1.05	1.77	.41	
Cohesion Level	1.71	.73	5.45*	5.56	.85	.75	2.33	1.27	-.86	.52	2.82	.42	6.69	.04	
Flex Level	-1.69	.98	3.01	.18	-1.73	.99	.18	.99	-.03	.51	.003	.97	3.84	.15	
Final Model													10.76	.03	.09
Cohesion Level	.86	.57	2.27	2.38	.05	.59	1.05	.01	-.81	.41	5.99*	.44	4.98	.08	
Rigid	-.11	.05	5.52*	.90	-.10	.05	.82	4.56*	.01	.04	.03	.94	6.14	.05	

Appendix: Table B14

Differences among means of continuous variables based on Substance Use Severity Group

Scale/Group	μ_1	μ_2	μ_1- μ_2	F-Value	*P*	df_{bt}	df_{wi}
Disengagement				0.30	.74	2	136
1vs.2	17.78	16.68	1.10		.74		
1vs.3	17.78	16.67	1.11		.76		
2vs.3	16.68	16.67	.01		>.99		
Balanced Cohesion				1.67	.19	2	136
1vs.2	21.63	23.76	-2.12		.36		
1vs.3	21.63	22.02	-.39		.97		
2vs.3	23.76	22.02	1.74		.28		
Enmeshment				2.25	.11	2	136
1vs.2	15.04	14.23	.81		.81		
1vs.3	15.04	12.53	2.51		.18		
2vs.3	14.23	12.53	1.70		.18		
Rigid				3.10	.05*	2	136
1vs.2	20.90	17.30	3.60		.05*		
1vs.3	20.90	17.16	3.74		.06		
2vs.3	17.30	17.16	-.14		.99		
Balanced Flexibility				0.40	.67	2	136
1vs.2	18.04	18.50	-.47		.96		
1vs.3	18.04	17.44	.60		.94		
2vs.3	18.50	17.44	1.07		.64		
Chaotic				0.57	.57	2	136
1vs.2	17.24	15.94	1.30		.60		
1vs.3	17.24	15.71	1.53		.55		
2vs.3	15.94	15.71	.23		.98		

Communication				0.55	.58	2	136
1vs.2	29.73	32.34	-2.61		.55		
1vs.3	29.73	31.78	-2.05		.72		
2vs.3	32.34	31.78	.56		.95		
Satisfaction				1.41	.25	2	136
1vs.2	33.24	32.92	.33		.99		
1vs.3	33.24	29.80	3.45		.46		
2vs.3	32.92	29.80	3.12		.26		
Age				.28	.76	2	136
1vs.2	16.11	16.22	-.11		.91		
1vs.3	16.11	16.32	-.21		.76		
2vs.3	16.22	16.32	-.09		.88		
IES-R				4.60	.01	2	117
1vs.2	27.33	39.61	-12.28		.02*		
1vs.3	27.33	41.28	-13.95		.01		
2vs.3	39.61	41.28	-1.67		.86		
BDI-II				1.90	.16	2	128
1vs.2	11.88	15.19	-3.31		.42		
1vs.3	11.88	17.24	-5.36		.14		
2vs.3	15.19	17.24	-2.05		.53		
Substance Using				11.12	<.001	2	131
Peers							
1vs.2	6.78	8.97	-2.19		.06		
1vs.3	6.78	11.28	-4.51		<.001**		
2vs.3	8.97	11.28	-2.31		<.01*		

* p<.05, two tailed. **p<.01, two tailed.
"1"=Low Severity; "2"=Moderate Severity; "3"=High Severity

Appendix: Table B15

Categorical variables and Substance Use Severity Group

	Total N	Low Severity Group	Moderate Severity Group	High Severity Group	X^2	P value
Cohesion Level	139				8.10	.09
Disengaged		8	21	21		
Balanced		9	50	23		
Enmeshed		1	6	0		
Flexibility Level	139				1.96	.74
Rigid		5	24	18		
Balanced		12	51	25		
Chaotic		1	2	1		
Overall Group	139				2.98	.56
Balanced		7	39	17		
Midrange		7	24	14		
Extreme		4	14	13		
Gender	139				0.51	.78
Male		11	52	31		
Female		7	25	13		
Race	139				0.34	.84
Caucasian		16	70	41		
Other		2	7	3		
Custody	135				1.08	.90
Mother		8	41	22		
Both Parents		3	13	8		
Other		7	20	13		
Highest level of	119				0.58	.75

education in house						
Some HS/GED/HS Diploma		8	38	18		
Col/Trade School or Higher		6	30	19		
Court Ordered to Tx	116				0.36	.84
No		5	29	16		
Yes		9	37	20		
Previous SU Tx	135				1.95	.38
No		6	21	8		
Yes		12	53	35		
Family Member Substance Abuse	132				11.87**	<.01
No		9	11	8		
Yes		8	60	36		

* p<.05, two tailed. **p<.01, two tailed

Appendix: Table B16

Bivariate Correlations Matrix of all variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Dis	__														
2 Coh	-.43**	__													
3 Enm	.19*	.29**	__												
4 Rig	.22*	.17*	.36**	__											
5 Flex	-.25**	.62**	.47**	.14	__										
6 Cha	.49**	-.13	.54**	.10	.03	__									
7 Com	-.52**	.75**	.14	.02	.60**	-.19*	__								
8 Sat	-.41**	.69**	.23**	.07	.59**	-.10	.76**	__							
9 Coh: Dis v. Bal	-.37**	.78**	.30**	.12	.58**	-.05	.60**	.53**	__						
10 Coh: Dis v. Enm	-.44**	.81*	.33*	-.05	.56**	-.14	.70**	.57**	NA	__					
11 Coh: Bal v. Enm	.23*	.46**	.07	-.03	.12	-.06	.30**	.25*	NA	NA	__				
12 Flex: Rig v. Bal	.01	.35**	.46**	-.06	.72**	.26**	.32**	.35**	.37**	.26**	.03	__			
13 Flex: Rig v. Chao	-.06	.42**	.61**	.10	.86**	.14	.39**	.52**	.31*	.70**	.26	NA	__		
14 Flex: Bal v. Chao	-.05	.20	.20	.12	.40**	-.01	.17	.28**	.11	.37	.15	NA	NA	__	
15. Overall Level	.17*	-.57**	-.38**	-.01	-.66**	-.12	-.46**	-.44**	-.82**	-.13	.49**	-.80**	.16	.40**	__

*p<.05; **p<.01

Continuation of Bivariate Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16. Race	-.06	.15	.09	.11	.01	.04	.06	.10	.11	.32*	.16	-.05	-.10	-.06	-.03
17. Gender	.03	-.08	-.03	-.12	-.07	.05	-.05	-.04	.03	.09	.06	-.03	.09	.09	.03
18. Education	-.25**	.10	-.09	.07	-.03	-.24**	.06	.11	.22**	-.14	-.09	-.18	-.21*	-.02	-.03
19. Custody: Mother v. Both	.08	-.07	.06	.20	.03	.04	-.11	-.08	.03	.01	-.01	-.04	-.18	-.13	-.03
20. Custody: Mother v. Other	.29**	-.14	.14	.18	-.01	.16	-.19*	-.10	-.15	.04	.12	.01	-.07	-.05	.07
21. Custody: Both v. Other	.20	-.06	.08	-.05	-.03	.11	-.07	-.03	-.18	.02	.13	.04	.17	.12	-.10
22. Past Tx	-.09	.04	.22*	.01	.14	.10	.02	.02	.02	-.01	-.02	.12	.05	-.01	-.09
23. Court Ordered to Tx	-.07	.05	.08	.01	.02	.05	.01	.06	-.10	.15	.18	.21*	-.05	-.13	-.03
24. IES-R	-.15	<.01	.06	-.02	-.03	-.06	.06	.09	.10	-.10	-.13	-.11	<.01	.05	.03
25. BDI-II	-.08	-.13	.04	-.03	-.05	.04	-.10	-.09	.01	-.06	-.06	-.10	-.06	<.01	.08
26. Peer Substance Use	.05	-.13	-.19*	-.23**	-.14	-.02	-.06	-.15	-.18*	-.04	.06	-.05	-.28*	-.18	.12
27. Family Sub Abuse	.12	-.17	.03	-.05	-.08	.12	-.09	-.17	-.14	-.27*	-.12	-.15	.11	.13	.17
28. Low vs Mod Severity	-.08	.14	-.06	-.25*	.03	-.10	.11	-.01	.16	.13	.01	-.02	-.12	-.08	-.04
29. Low vs High Severity	-.09	.03	-.22	-.27*	-.04	-.13	.10	-.15	-.01	-.28	.27	-.12	-.18	-.08	.11
30. Mod vs High Sev	<.01	-.14	-.17	-.01	-.08	-.02	-.03	-.14	-.19*	-.34*	-.18	-.10	-.05	<.01	.16

*p<.05; **p<.01

Continuation of Bivariate Correlation Matrix

Variable	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
16. Race	__														
17. Gender	.01	__													
18. Education	.11	-.17	__												
19. Custody: Mother v. Both	-.04	.05	.08	__											
20. Custody Mother v. Other	-.15	-.20*	-.05	NA	__										
21. Custody Both vs.Other	-.13	-.27*	-.13	NA	NA	__									
22. Past Tx	.05	-.14	.09	.12	.01	-.12	__								
23. Court	.12	-.06	.06	-.05	-.08	-.03	.16								
24. IES-R	-.04	.11	-.02	-.11	-.01	.12	.06	-.14	__						
25. BDI-II	-.02	.28**	.02	.07	-.23*	-.30*	.02	.11	.28**	__					
26. Peer Sub Use	-.17*	.05	-.05	-.01	.01	.02	-.15	.03	<.01	.05	__				
27. Family Sub Abuse	-.11	-.04	.10	-.05	.04	.09	-.01	-.09	.02	.07	.12	__			
28. Low vs Mod Sev	-.03	-.05	.02	-.02	-.11	-.08	.04	-.02	.30**	.12	.24**	.35**	__		
29. Low vs High Sev	-.07	-.09	.08	-.01	-.09	-.83	.16	-.06	.32*	.24	.50**	.35**	NA	__	
30. Mod vs High Sev	-.04	-.04	.06	.02	.04	.01	.11	-.05	.04	.12	.30**	-.03	NA	NA	__

*p<.05; *p<.01

Appendix: Table B17

Differences among means of ADAS subscales based on Substance Use Severity Group

Scale/Group	μ_1	μ_2	$\mu_1 - \mu_2$	F-Value	*p*	df_{bt}	df_{wi}
Alcohol Frequency				23.22	<.001**	2	119
1 vs. 2	5.06	7.79	-2.73		.11		
1 vs. 3	5.06	13.44	-8.38**		<.001**		
2 vs. 3	7.79	13.44	-5.64**		<.001**		
Alcohol Problems				13.79	<.001**	2	130
1 vs. 2	4.49	7.66	-3.17		.18		
1 vs. 3	4.49	13.21	-8.72**		<.001**		
2 vs. 3	7.66	13.21	-5.55**		<.001**		
Drug Frequency				9.05	<.01**	2	113
1 vs. 2	4.53	12.52	-7.99		.03		
1 vs. 3	4.53	17.97	-13.44**		<.001**		
2 vs. 3	12.52	17.97	-5.46*		.05		
Drug Type of User				11.01	<.001**	2	119
1 vs. 2	5.87	10.72	-4.84		.02		
1 vs. 3	5.87	14.67	-8.79		<.001**		
2 vs. 3	10.72	14.67	-3.95		<.01*		
Drugs Problems				7.35	<.01**	2	130
1 vs. 2	4.22	9.33	-4.94		.03		
1 vs. 3	9.33	12.03	-7.64		<.01**		
2 vs. 3	9.33	12.03	-2.70		.14		

Omnibus tests: * p<.05, **p<.01,
Pairwise comparisons (Bonferoni Adjustment was made): * [a]p<..017, **[a]p<..003,