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Improvement in Psychopathology Among Opioid-Dependent Adolescents During Behavioral-Pharmacological Treatment

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Abstract

Objective—To examine changes in behavioral and emotional problems among opioid-dependent adolescents during a four week combined behavioral and pharmacological treatment.

Methods—We examined scales of behavioral and emotional problems in youth using the Youth Self Report (YSR) measure at the time of substance abuse treatment intake and changes in scale scores during treatment. Participants were 36 adolescents (ages 13–18 eligible) who met DSM-IV criteria for opioid dependence. Participants received a 28-day outpatient, medication-assisted withdrawal with either buprenorphine, or clonidine, as part of a double-blind, double-dummy comparison of these medications. All participants received a common behavioral intervention, composed of three individual counseling sessions per week, and incentives contingent on opioid-negative urine samples (collected three times/week) attendance and completion of weekly assessments. Results: Although a markedly greater number of youth who received buprenorphine remained in treatment relative to those who received clonidine, youth who remained in treatment showed significant reductions during treatment on two YSR grouping scales (Internalizing Problems and Total Problems) and four of the empirically based syndrome scales (Somatic, Social, Attention and Thought). On YSR competence and adaptive scales, no significant changes were observed. There was no evidence that changes in any scales differed across medication condition.

Conclusions—Youth who were retained demonstrated substantive improvements in a number of clinically meaningful behavioral and emotional problems, irrespective of pharmacotherapy provided to them.

Keywords

adolescents; opioid-dependence; psychopathology; treatment

Adolescent heroin and other opioid abuse is a significant public health concern. Prescription opioid abuse among youth has been estimated to have increased over 500% in the past

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decade, making prescription opioids the second most commonly abused illicit drug among adolescents in the U.S. The annual prevalence rates (past year use for 2009) for OxyContin (a controlled-release form of oxycodone hydrochloride that promotes rapid euphoria when crushed before consumption) is 2.0 %, 5.1 % and 4.9 % in 8th, 10th, and 12th grades, respectively while annual prevalence rates (past year use for 2008) for Vicodin (hydrocodone/acetaminophen) is 2.5 %, 8.1 %, and 9.7 % across the same grades. Data from the Monitoring the Future Study (MTFS, 2009) indicate that the annual prevalence of heroin use has leveled off in recent years and is below 1% across 8th, 10th and 12th grades (0.5 %, 0.6 %, and 0.3 %, respectively, for past year use for 2009). Significantly, recreational opioid use has been suggested to be a new route to heroin abuse and dependence (Siegal et al., 2003).

Consistent with the increasing prevalence of opioid abuse among adolescents, treatment admissions for substance use disorders (SUDs) among youth who identified opioids as their primary drugs of abuse increased by 35% (82% for prescription opioids, 4.9% for heroin) from 1997 to 2007, according to the most recently published estimates (Substance Abuse and Mental Health Services Administration (SAMHSA) Office of Applied Studies (OAS), 2009). Despite the mounting evidence supporting the prevalence of the problem of adolescent opioid use as well as the treatment needs of these adolescents, limited research has been conducted with this population (Subramaniam et al., 2009).

The few studies that have described the characteristics of treatment-seeking adolescent opioid users (Clemmey et al., 2004; Crome et al., 1998; Gordon, 2002; Gordon et al., 2004; Hopfer et al, 2000; Marsch et al., 2005; Perry & Duroy, 2004; and Pugatch et al, 2001) have typically focused on adolescent heroin users and have characterized them as typically white and male. This group has been shown to typically start experimenting with substances as young as 10 years; report daily use of heroin; report administering heroin intravenously; and experience a number of legal and/or psychiatric problems. Even fewer studies have characterized adolescents who use prescription opioids (Sung et al, 2005; McCabe et al, 2005), highlighting that similar to adolescent heroin users, this group is generally white.

Although the scientific literature on the treatment of adults who are opioid dependent is extensive, only two published randomized, controlled trials to date have focused on the systematic evaluation of treatments for youth with opioid use disorders. One such study (Woody et al., 2008) evaluated the use of buprenorphine combined with naloxone (Suboxone®), among an adolescent and young adult population (15–21 yrs). Overall, patients in the 14-day outpatient Suboxone detox group had a higher proportion of opioid-positive urine test results, compared with those in 12 weeks of Suboxone treatment. By week 12, 20.5% of detox patients remained in treatment vs. 70% of participants receiving the 12-week treatment. Further, almost all of the other secondary outcomes, including reduced injection drug use and lower participation rates in non-study addiction treatment, favored the longer course of buprenorphine.

The second such trial is, to our knowledge, the only published, randomized clinical trial to date that has examined treatment outcomes specifically among opioid-dependent adolescents (Marsch et al. 2005). Adolescent participants (ages 13–18 eligible) were randomly assigned to a 28-day detox with buprenorphine or clonidine. In addition to the medication, all participants received intensive behavioral therapy drawing on the Community Reinforcement Approach (CRA; Meyers and Miller, 2001), and vouchers (positive rewards) for opioid-negative urines, attendance, and weekly assessments. Results demonstrated that overall, buprenorphine was more efficacious than clonidine in treating this population of adolescents dependent on opioids when combined with intensive behavioral therapy. In particular, retention was better (72% vs. 36%) and there were more opioid-negative urines

(64% vs. 32%) among those who received buprenorphine relative to those who received clonidine.

Numerous treatment studies conducted with adult substance-using populations have demonstrated that individuals' psychosocial functioning often improves along with their substance use during treatment (Brook & Whitehead, 1980; De Leon, 1984; 1989), although it is important to note that some psychopathological symptoms pre-date substance abuse, while others are the result of pharmacological effects of the substances. To our knowledge, no systematic research to date has specifically examined the extent to which opioid-dependent youths' psychopathology (emotional and behavioral problems) may be impacted from substance abuse treatment. Such an investigation is warranted due to the well-established association of psychopathology and substance use among adolescents with opioid use disorders (Subramaniam et al., 2009). Additionally, understanding the extent to which emotional and behavioral problems improve among youth during treatment for opioid dependence is important for better understanding how their quality of life may be improved during treatment.

The Youth Self-Report (YSR; Achenbach and Rescorla, 2001) is a commonly used measure of emotional and behavioral problems among youth; and despite wide use in over twenty countries, this instrument has been infrequently used to characterize youth who are seeking treatment for substance abuse. The YSR assesses three broad areas: competence and adaptive scales, empirically based syndrome scales that load onto superordinate grouping scales (internalizing, externalizing, and total problems) and DSM-oriented scales (which were more recently added to relate syndrome scales to DSM criteria).

A search of a variety of scientific databases as well as the Achenbach System of Empirically Based Assessment (ASEBA) Bibliographic database (www.asebabib.org) revealed only a handful of studies utilizing the measure with adolescent substance abuse treatment seeking samples. To our knowledge, only three of these studies have used the YSR to prospectively examine treatment outcomes among substance-using adolescents (Waldron et al., 2007; Kamon, et al., 2005; Rivers et al., 2001). No statistically significant reductions in internalizing or externalizing scales scores on the YSR were observed among youth in the first two studies. However, Rivers et al. found that among adolescents participating in an 8-week hospital-based, adolescent substance abuse program, across all 8 YSR scales used, female participants showed statistically significant improvements in their scale scores. Male participants made modest changes on only the Somatic Complaints scale.

The present study used the YSR to examine changes in behavioral and emotional problems among opioid-dependent adolescents enrolled in a randomized, controlled trial designed to evaluate the efficacy of combined behavioral-pharmacological treatments for opioid-dependent adolescents (Marsch et al., 2005). To our knowledge, the present study is the first to use the YSR as an outcome measure to assess changes in psychopathology during behavioral-pharmacological treatment for opioid-dependent adolescents.

Methods

Participants

Participants were 36 adolescents (aged 13–18 years eligible) who met *DSM-IV* criteria for opioid dependence. Pregnancy at intake (or as identified by urine tests during treatment) or evidence of an active, significant psychiatric disorder (e.g. psychosis) or medical illness (e.g. Cardiovascular disease) were exclusionary. In the interests of generalizability, codependence/abuse of alcohol, cocaine, or marijuana were not deemed exclusionary

criteria. In the event that an individual who sought treatment did not meet inclusionary criteria, they were referred to a local treatment center. All participants were self-referred.

If a participant were less than 18 years old, a parent or guardian provided informed consent and the adolescent provided informed assent to participate. Participants confirmed to be 18 years of age provided Informed Consent. This study was approved by the appropriate institutional review board and was conducted at a university-based research clinic.

Procedures

In the primary trial, participants were randomly assigned to detoxification with buprenorphine or clonidine. The detoxification was part of a double-blind, double dummy comparison of these medications (18 participants per medication condition). Those in the buprenorphine condition received sublingual tablets of the mono buprenorphine product, Subutex®, (starting doses of 6–8 mg based on weight and level of dependence) each day under the observation of a research nurse. Doses were tapered by 2 mg each week. As the maximum dose was 8 mg, and each tablet contained 2 mg, all participants were given a total of 4 tablets each day, which contained active or placebo buprenorphine. Participants in the clonidine group received placebo buprenorphine tablets throughout, as well as clonidine patches of 0.1mg on intake day and day 1, with an additional 0.1 added from days 2 to 6 (for a total of 0.2 mg on these days). In this condition, all patches were removed on day 7 and replaced with a 0.2 mg dose. Subsequently, on day 14, all patches were again removed and replaced with a 0.1 mg dose. Then on day 21, all patches were removed and replaced with a placebo patch (0 mg dose). Participants in the buprenorphine condition received placebo clonidine patches throughout the study.

Aside from the daily provision of medication, research staff collected urine samples under observation at intake and then on a Monday-Wednesday-Friday schedule throughout the study. Samples were screened before behavioral therapy sessions (also conducted on Mondays-Wednesdays-Fridays) using semi-quantitative urinalysis procedures (for methadone, opiates, propoxyphene, cocaine, benzodiazepines, and marijuana), with missing samples were counted as opioid-positive.

Drawing on the Community Reinforcement Approach (CRA; Meyers and Miller, 2001), participants engaged in hour-long, behavioral therapy sessions with trained staff three times per week. Specifically related to drug use, participants were provided with counseling on: stimulus control training to eliminate/reduce high-risk situations for drug use and simultaneously increase alternative activities which compete with or are unrelated to drug use; urge control training to facilitate participant recognition and control thoughts/plans to use drugs; and social control/contracting to encourage participant family members to provide support to the participant outside the clinic setting (contributing to the generalizability of the skill sets).

Counseling sessions were manual-guided and included a primary focus on the functional analyses of each individual's substance use (to identify the various risk factor(s) for their use and the consequences of their use) as well as self-management planning (to teach individuals how to manage high risk situations for substance use). Additionally, a primary emphasis was placed on initiating and sustaining engagement in healthy, reinforcing activities that could function as alternatives to substance use (e.g., healthy recreational activities, education-related goals, and employment). Youth were also encouraged to identify members of their social network who were not substance users with whom they could spend increased time. Youth were encouraged to identify such healthy reinforcing activities and safer friends/acquaintances and to engage in such activities/spend time with such friends on a regular basis between counseling sessions (with follow-up by the clinician in sessions).

Additionally, many sessions focused on cognitive and behavioral skills training to help youth successfully discontinue their substance use. This included drug refusal skills training to teach youth the importance of learning effective strategies for refusing drug offers and how they can apply such strategies in their own lives. Additional counseling sessions focused on problem solving skills, strategies for effective decision-making, communication skills, and skills for managing thoughts about using. All youth were also provided with HIV and STD prevention education, tailored to their risk profile. In addition to offering training in the skills necessary to reduce/eliminate drug use, therapy sessions also addressed other needs of the adolescents as determined on an individual basis through collaborative goal setting.

Participants earned vouchers contingent upon the submission of opioid-negative urine samples, clinic attendance and completion of weekly assessments. The first opioid-negative urine had a value of \$2.50 (in vouchers). This value increased by \$1.25 each session with a \$10 bonus for every 3 consecutive opioid-negative urine samples provided. Failing to submit a sample/submitting an opioid-positive urine sample functioned to reset the value of the next voucher to the start value. Continuous abstinence throughout the study earned a participant vouchers totaling \$152.50. Clinic attendance (\$2.50 per day) and completion of weekly assessments (\$5.00 per week) increased the total possible earnings to \$242.50. Vouchers could be redeemed for goods and services consistent with participants' treatment plans and were intended to be used to support alternatives to drug use. Voucher earnings were tracked via a computer program, but research staff were responsible for purchasing the goods and services participants requested with their voucher earnings. Although this procedure added additional cost to intervention delivery, it was employed to help promote the initiation and maintenance of opioid abstinence.

Outcome Measure

The Youth Self-Report (YSR; Achenbach and Rescorla, 2001), was completed by youth participants in this study at intake and weekly thereafter for the duration of the 4-week study (thus, 5 assessment time-points). The YSR is a commonly-used measure of youth's behavioral and emotional problems for youth ages 11–18. It contains two sub-areas: 1) Competence and Adaptive Scales (Activities, Social, Academic) including items that measure the child's participation and performance in hobbies, games, sports, school, jobs chores, friendship and activities, (i.e. Compared to others of your age, about how much time do you spend in each? 'less than average,' 'average,' 'more than average'; Compared to others of your age, how well do you do each one?, with same response categories as previous); 2) 112 items using a 3-point response scale ('not true,' 'somewhat or sometimes true,' 'very true or often true') that measure 8 subscale syndromes of three broad grouping scales (Internalizing (1–3), Externalizing (7–8)), and Total Problems (1–8)): 1) Anxious/Depressed, e.g. 'I cry a lot,' 2) Withdrawn/Depressed, e.g. 'I am too shy or timid,' 3) Somatic Complaints, e.g. 'I have nightmares,' 4) Social Problems, e.g. 'I'm too dependent on adults,' 5) Thought Problems, e.g. 'I pick my skin or other parts of my body,' 6) Attention Problems, e.g. 'I fail to finish things that I start,' 7) Delinquent Rule-Breaking Behaviors, e.g. 'I use drugs for non-medical purposes' and 8) Aggressive Behaviors, e.g. 'I argue a lot.'

As mentioned above, this instrument has been used extensively both in the United States and in many other countries (translations are available in over 20 languages). In terms of reliability, the Competence scales have moderately high internal reliability, with alphas ranging from .55–.75, and the empirically based problem scales alphas range from .71–.95. The borderline (B) and clinical (C) ranges for the Competence scales are as follows: Activities and Social, 31–35 (B) and < 31 (C); and Total Competence, 37–40 (B) and < 37 (C). The borderline and clinical ranges for the Syndrome scales are 65–69 (B) and >69 (C).

Finally, the borderline and clinical ranges for the Grouping scales are 60–63 (B) and > 63 (C).

Results are presented below for the Competence and Adaptive scales, and empirically based Syndrome scales only (along with their associated broad grouping scales). Due to the strong correlations between these two scale areas and the DSM-oriented scales, results will not be presented for DSM-oriented scales due to redundancy. (See Achenbach and Rescorla (2001) for a detailed description of the rationale for the construction of the DSM-oriented scales, as well as how they were constructed). The Total Competence score is the sum of the raw scores of the Activities, Social and Academic performance. The Total Problems score is the sum of the eight syndrome scales.

Statistical Methods

Repeated measures analyses of variance (SAS, PROC MIXED) were used to evaluate changes in mean scale scores over time in an intent-to-treat analysis. The model included the within-subject factor time (intake, Weeks 1, 2, 3, and 4), and across-subject factor medication group (buprenorphine or clonidine) and their interaction. Post-hoc tests were performed based on Fisher's LSD to evaluate changes from baseline in mean scale scores at each post-intake treatment week. Analyses were performed on raw scores in order to take account of the full range of variation in these scales, as, in accordance with suggested procedures outlined in the YSR scoring manual, T-scores (standardized scores) were truncated at 50 on each syndrome scale and 65 on the competence scales due to the fact that few youth scored below these values on many of these scales. T-scores are used for graphical purposes because they are based on percentiles for normative samples and therefore provide convenient ways to quickly assess whether youth report higher levels than are reported from a normative or 'healthy' sample of youth. Both t-scores and raw scores were analyzed and trends in the two sets of scores paralleled each other. All means presented represent least squares means which adjust for incomplete data due to subject drop-out. The percent of subjects with data available at each follow-up assessment was: 67% (week 1); 67% (week 2); 50% (week 3) and 47% (week 4). Statistical analyses were performed using SAS Statistical Software Version 9 (SAS Institute, Cary NC).

Results

Participants—Participant characteristics are reported in Table 1. As seen in this table, participants were predominantly white, most were female, average age was just over 17 years of age with opioid use beginning at a mean age of 15 years. About one-third reported opioid use via an injection route, and half reported heroin as their primary opioid. Approximately half the sample had prior outpatient substance abuse treatment experience, and over a third had prior inpatient substance abuse treatment experience. Other drug dependencies at intake included alcohol, cannabis, nicotine, cocaine and amphetamines, and a minority met criteria for DSM-IV psychiatric diagnoses: one fifth met criteria for either ADHD, Oppositional Defiant Disorder or Major Depressive Disorder; close to 10% met criteria for Conduct Disorder, Separation Anxiety Disorder, and Manic Episode; while almost 35% met criteria for Mixed Anxiety Depressive Disorder. No significant differences were observed in participant characteristics across medication conditions at baseline (Thus, data in Table 1 are collapsed across medication condition).

YSR Syndrome Scales—As previously described, the YSR, as used in this study, assesses three broad areas: empirically based syndrome scales that load onto super-ordinate grouping scales (internalizing, externalizing, and total problems), competence and adaptive scales. Although significant improvements on various YSR sub-scales were observed across time among participants retained for the duration of treatment (72% in the buprenorphine

medication condition and 39% of those in the clonidine condition) (detailed below), none were determined to be dependent on treatment condition ($p > .05$ for all group by time interactions). Note that opioid-abstinence rates were quite similar for participants in both study conditions who remained in treatment during the 4-week treatment window. Specifically, participants in the buprenorphine condition who were retained in treatment ($n=13$) had a mean of 80% opioid-negative urine samples, while those in the clonidine condition who were retained in treatment ($n=7$) had a mean of 70% opioid-negative urines at the end of treatment ($t_{(18)} = 0.96$; $p=.35$).

Of the 3 syndrome scales that load on the internalizing broad grouping scale (Anxious, Withdrawn and Somatic), there were no significant changes in mean scores from intake through Week 4 on either the Anxious or Withdrawn Syndrome scales [Anxious ($F_{(4,74)} = .70$; $p = .59$) and Withdrawn ($F_{(4,74)} = 1.37$; $p = .25$), Figure 1]. However, mean Somatic scale scores decreased significantly from baseline during the treatment period treatment ($F_{(4,72)} = 5.86$; $p < .001$). This shift was also of clinical significance, given that mean scores transitioned from the borderline clinical range to well into the non-clinical range. Of the two syndrome scales which load on the Externalizing scale (Aggressive and Rule-Breaking), there were no significant changes in the Aggressive scale scores from intake through Week 4 ($F_{(4,74)} = 1.70$; $p = .16$) or Rule Breaking scale scores; however, the latter approached significance ($F_{(4,74)} = 2.45$; $p = .053$). Lastly, Social, Thought and Attention scales load on both Internalizing and Externalizing broad grouping scales and are thus considered 'mixed syndromes' in the middle of the profile. There were significant improvements from intake to Week 4 on Social ($F_{(4,74)} = 2.70$ $p < .05$), Attention ($F_{(4,74)} = 3.89$; $p < .01$), and Thought scales ($F_{(4,74)} = 4.63$; $p < .01$).

YSR Broad Grouping Scales—Scores on the YSR's broad grouping scales (Internalizing, Externalizing and Total Problems) improved in a manner that was both statistically and clinically significant across treatment among participants retained in treatment. (Figure 2). Scores from intake to Week 4 changed significantly for Internalizing ($F_{(4,74)} = 3.30$; $p < .05$) and Total Problems ($F_{(4,74)} = 4.30$; $p < .01$), and approached significance for Externalizing ($F_{(4,74)} = 2.40$; $p = .058$). All three of these broad grouping scale scores changed from the borderline to sub-clinical range by Week 4.

Competence and Adaptive Scales—From intake to Week 4, changes in the Activities scale ($F_{(4,66)} = .93$; $p = .45$) and Social scale scores during treatment were non-significant ($F_{(4,53)} = 1.56$; $p = .20$) (Figure 3). There were not enough completed responses at Week 4 to evaluate Academic Performance scores and thus Total competence scores were not computed.

Discussion

This study produced three important findings:

First, on six of thirteen YSR scales, there were significant improvements from baseline to Week 4. Of those scales that comprise the Internalizing Grouping (Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints), only the Somatic Complaints scale evidenced significant change. A closer look at the items of this scale reveals that a majority are proxies for withdrawal symptoms (i.e. aches, headaches, nausea, skin problems, stomach problems, vomiting, etc.), attesting to the critical and necessary reductions in withdrawal symptomology in the early weeks of treatment. Changes on the Somatic scale were also of clinical significance, as participants moved from the borderline clinical range to the sub-clinical range on average. The change on the Somatic scale is largely responsible for the overall shift on the Internalizing scale from the borderline clinical to sub-clinical range;

however, changes on both the Anxious and Withdrawn scales also occurred in the desired direction and likely contributed to overall improvements in Internalizing.

Of those scales that load on both Internalizing and Externalizing grouping scales, all three 'mixed syndrome' scale scores changed significantly during the four-week period. The changes in the Social and Attention scale scores were arguably of limited clinical significance in that the baseline averages were not in the clinical range and in fact were several points lower than the average for the nationally representative survey sample of youth (1999 National Survey of Children, Youths, and Adults) referred to mental health services (see Achenbach and Rescorla (2001) for more information on this sample); however, the change over the four-week period did bring the sample for the Social ($M = 56.6$): and Attention ($M = 56.3$) scales closer to 'non-referred' (subsample from abovementioned national probability sample who were not considered to have serious behavioral/emotional problems because they had not received professional help for behavioral, emotional, substance use or developmental problems in the preceding 12 months) averages for boys and girls ($M = 54.4$) for both genders on both Scales). The changes on the Thought scale are different from those on the Social and Attention scale scores in that our sample average was higher at baseline than the average for the referred youth from the national survey sample. Also, at week four, our sample changed ($M = 54.2$), making it more consistent with the average for the non-referred youth ($M = 54.2$). It is important to note that similar to items on the Somatic Complaints scale, about 1/4 of the items on the Thought problems scale are arguably proxies for withdrawal symptoms. Thus, these changes in part seem to attest to the effectiveness of the intervention to address withdrawal. The remaining items on the Thought problems scale address self-management issues (i.e. picking skin, repetitive behaviors, cannot get mind off certain thoughts). Finally, due to the large improvements in half of the Syndrome scales that are summed to compute Total Problems, changes on this Grouping scale were statistically and clinically significant. Of note, across all 8 Syndrome scales, there was movement in the desired direction. Thus, despite the brevity of the measurement period, positive change was occurring across a wide variety of symptomology. Note that we likely didn't observe differences across the two medication conditions in the present analyses (despite observing greater overall retention in the buprenorphine arm in the original trial) because opioid abstinence rates were quite high and similar among those that were retained through the treatment period in the two treatment arms. Thus, the observed changes on YSR scales among those retained in treatment may have largely resulted from reduced opioid use among this group.

On a theoretical level, the observed changes on these mixed syndrome scales may also have been impacted, in part, to certain skills taught and work accomplished in the weekly behavior therapy sessions. Changes on the Social scale may have occurred due to the focus on communication skills and the encouragement provided in therapy to identify non substance-using members of participants' social network with whom they could spend increased time and to engage in safe activities with these individuals on a regular basis between counseling sessions. Although three of eleven of the items on the Thought scale are proxies for withdrawal symptoms, observed changes on both the Thought scale and Attention scales may also be linked to the cognitive behavioral skills taught, such as managing thoughts about use, self-management, as well as problem solving and decision-making skills.

The fact that no significant changes were evidenced on some of the scales warrants a closer look. The lack of significant changes on the Anxious or Withdrawn scales may be due to a floor effect in that the intake means on these scales were not dramatically dissimilar from YSR scale scores for non-referred youth (Achenbach and Rescorla, 2001). Although neither of the scales comprising the Externalizing scale (Aggression and Rule Breaking) was

significantly changed at week four relative to intake, Rule-Breaking approached significance ($p = .053$). These changes certainly contributed to the shift in the Externalizing scale scores from well into the borderline clinical range to the sub-clinical range. Figure 1 shows that the trends for Rule-Breaking and Externalizing are very similar and that, despite weekly decreases through the third week, there was an increase thereafter that attenuated a potentially significant effect. Problems with aggression and rule-breaking are typically the reasons why adolescents are flagged for treatment by parents and school officials in the first place. In fact, compared with the average for the national survey sample of referred youth mentioned above, this sample was about 5 full points higher (64.4 vs. 59.7 for boys and 58.8 for girls). Thus, it is encouraging that minor decreases were evident on Rule-Breaking by the end of treatment.

Finally, a lack of significant changes on the Competence scales is not surprising. This scale taps into longer term goals for which one would not necessarily expect marked improvement in such a short period of time (i.e. one month). Again, in the first month of treatment for a substance of abuse as severe as opioid dependence, it would be highly unlikely that adolescents would be attesting to changes in, for example; the average amount of time spent playing a sport (response options: less than average, average, more than average); changes in how they would compare themselves to others their age in terms of getting along with brothers and sisters (response options: worse, average or better); or performance in academic subjects (response options: failing, below average, average, or above average). Interestingly, no studies reviewed for this paper included any information regarding how samples of drug using youth fared with respect to these measures. Additionally, given the low response rate by week four on the open-ended items assessing competence, it is possible that our sample's pattern of responding was similar to others in this regard and that it is indicative of the problems associated with the increased response effort involved in open-ended questions.

A second important finding from this study is the noteworthy temporal pattern associated with changes during treatment. It was particularly striking that any significant improvements in behavioral and emotional functioning were observed as early as the first week of treatment (see Figures 1 and 2 for post-hoc comparisons comparing each treatment week to baseline on the scales where F -tests for main effects showing changes over time were significant, i.e. Somatic, Internalizing, Social, Thought, Attention, Total Problems). This finding may be, at least in part, due to the role of pharmacotherapy in reducing opioid use and managing withdrawal symptoms. Another possible explanation is engagement with staff, the prerequisite first order of business in substance abuse treatment. Increasing the odds against treatment success in samples such as ours, adolescents with opioid dependence often have limited parental involvement in their lives. Thus, these youth often do not have trusting relationships with adults on which to model early exchanges with clinical staff. Ultimately, staff may have a small window of opportunity to successfully communicate warmth and empathy for the efforts of the adolescents. Participants in this study attended the clinic every day of the 28 day treatment and met with their therapist three times per week. By remaining in treatment, participants were able to reap the extra-therapeutic benefits of this multi-component intervention package.. Hand in hand with the reduction in withdrawal symptoms (as evidenced by Figure 1 - Somatic Complaints graph) were reductions in other significant emotional and behavioral domains which stresses the point that with changes in drug use come benefits many opioid-dependent youth may not even realize are possible.

A third major finding from this study is that many of the initial changes observed as early as the first week were continued for up to three to four weeks. This finding attests to the mutability of emotional and behavioral problems early on in treatment among some of the most severely drug-impacted adolescents. These adolescents had been using opioids for an average of about two years prior to this treatment experience. That they were endorsing

improvements each week compared to previous weeks speaks to the power of this intervention to interrupt long-standing patterns of behavior. It is important to note that by the fourth week, the majority of those retained were those in the buprenorphine condition. In addition to its role in the controlling opioid-withdrawal symptoms, buprenorphine is an opioid and, as such, functions as a mood stabilizer, which likely also contributed to the observed outcomes. The decreased retention among the clonidine group strengthens this assertion given that clonidine operates on the autonomic nervous system only. This finding of changes maintained throughout treatment is also supported by the evidence that the longer one remains in treatment, regardless of the type of intervention offered, the more likely one is to make significant changes consistent with long-term goals of abstinence, etc.

There are several limitations that warrant attention. First, self-selection bias is a limitation in that all participants were treatment-seeking youth who were already arguably more motivated than other opioid-dependent youth to make necessary changes in their lives. Second, the brevity of the measurement period (i.e. lack of follow-up data) is a significant limitation of the current study as it is unclear whether these changes were maintained post-treatment. Third, these data analyses correspond only to those participants for whom data were available at each time-point and does not consider those who dropped out of treatment. Finally, there is a possibility that observed changes may have been due to a measurement effect. However, we think this is unlikely, given that we did not see changes across all scales, and for those scales where we did observe changes, the observed changes did not all follow the same temporal pattern.

Future work in this area is needed due to both the brevity of the follow-up period, as well as the investigation of one form of behavioral therapy. A lengthier measurement period would facilitate an increased understanding of whether changes such as those observed in the present study can be maintained. Additionally, a comparison of different types of therapy is warranted to better understand dose (# of weekly sessions) and content requirements (various behavior therapy approaches, as well as format [group or individual]) when behavior therapy is combined with pharmacotherapy. In addition, given the many changes these youth made during the 28-day treatment period, it would be useful to learn more about the potential effects of providing feedback to youth on scale score improvements.

Concluding Comments and Clinical Recommendations

Adolescents with behavioral and emotional (psychopathological) problems also frequently have substance abuse disorders and a large majority of adolescents with substance use disorders present with co-morbid psychopathology (Dennis et al., 2003). In fact, it is the rare adolescent who presents with a substance use disorder as a stand-alone issue, underscoring the need for services to be provided by counselors well trained to deal with both issues. The prevalence of substance abuse and dependence increases with age and there is a clear pattern of increased co-morbidity (i.e. psychopathological symptomology) for substance dependence compared with abuse (Roberts & Roberts, 2007). Thus, attention needs to be focused on data like these herein because the opportunity to interrupt these patterns may be time-sensitive and critical. Traditional treatment has long been found capable of modifying the psychological functioning of substance using clients (Brooke & Whitehead, 1980; De Leon, 1984; 1989) and equally positive substance abuse treatment outcomes have been obtained for both adolescents with and without diagnosable disorders (Grella, Joshi, & Hser, 2003). In the present study, the psychopharmacological intervention was capable of shifting scores from the borderline to sub-clinical ranges for the broad grouping categories of Internalizing, Externalizing and Total Problems, in only four weeks time.

Potential clinical recommendations from the present study are multiple: 1) collect data early because change across a broad array of symptomology can occur in the first weeks if withdrawal is effectively managed with a pharmacological intervention like buprenorphine and youth start to engage with clinical staff, 2) share these data with clients early because there is an opportunity to reinforce progress, potentially increasing retention rates, 3) help clients to make sense of the broad array of changes occurring in their lives, and 4) support clients through substance use lapses by encouraging a focus on progress made in other areas of their lives as a way to attenuate abstinence violation effect.

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Figure 2.
Grouping Scales

Figure 3.
Competence Scales

Table 1

Participant Characteristics at Intake

Characteristic	N=36
Age, y, mean (SD)	17.4 (0.7)
Age of first opioid use, mean (SD)	14.8 (1.6)
% Male	39
% Caucasian	97
% Injection route of opioid use	36
% Heroin primary opioid used	53
# of days used opioids in last 30 d., mean (SD)	27.7 (3.9)
% Prior outpatient substance abuse treatment	53
% prior inpatient substance abuse treatment	38
% Other drug dependence	
Alcohol	17
Cannabis	17
Nicotine	40
Cocaine	9
Amphetamine	6
% <i>DSM-IV</i> psychiatric diagnoses	
Attention-deficit/hyperactivity disorder	21
Oppositional defiant disorder	20
Major depressive disorder	18
Conduct disorder	9
Separation Anxiety Disorder	9
Mixed Anxiety-Depressive Disorder	34
Manic Episode	12