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Treatment Effectiveness of an Adolescent Residential Treatment Center for Males Using a Psychotropic Medication Reduction Protocol

Sean Dodge
Pacific University

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Treatment Effectiveness of an Adolescent Residential Treatment Center for Males Using a Psychotropic Medication Reduction Protocol

Abstract
The current retrospective study examined the treatment effectiveness of a residential treatment center (RTC) for adolescent males using a psychotropic medication reduction protocol. Of 226 participants 64% were admitted on medication, with 69% of those on multiple medications. At admission, those on medication endorsed more emotional and behavioral symptoms. Those admitted without medication had better program compliance. Two-thirds of those admitted on medication had all medications discontinued. The majority remaining on medication had a decrease in number of medications. At discharge and follow up periods, all participants, regardless of medication status, generally fared equally, lending support for the RTC program and its use of the medication protocol. Implications and suggestions for future research are included.

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TREATMENT EFFECTIVENESS OF AN ADOLESCENT RESIDENTIAL TREATMENT CENTER FOR MALES

USING A PSYCHOTROPIC MEDICATION REDUCTION PROTOCOL

A DISSERTATION

SUBMITTED TO THE FACULTY

OF

SCHOOL OF PROFESSIONAL PSYCHOLOGY

PACIFIC UNIVERSITY

HILLSBORO, OREGON

BY

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REQUIREMENTS FOR THE DEGREE

OF

DOCTOR OF PSYCHOLOGY

JULY 24th, 2009

APPROVED: _______________________________
Lisa Christiansen, Psy.D.

_______________________________
Steven L. Henry, Psy.D.,

PROFESSOR AND DEAN: _______________________________
Michel Hersen, Ph.D., ABPP.
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ABSTRACT

The current retrospective study examined the treatment effectiveness of a residential treatment center (RTC) for adolescent males using a psychotropic medication reduction protocol. Of 226 participants 64% were admitted on medication, with 69% of those on multiple medications. At admission, those on medication endorsed more emotional and behavioral symptoms. Those admitted without medication had better program compliance. Two-thirds of those admitted on medication had all medications discontinued. The majority remaining on medication had a decrease in number of medications. At discharge and follow up periods, all participants, regardless of medication status, generally fared equally, lending support for the RTC program and its use of the medication protocol. Implications and suggestions for future research are included.

KEYWORDS: adolescent, residential treatment center, medication, medication reduction, concomitant medication, treatment effectiveness, adolescent psychiatry
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INTRODUCTION

As defined by the surgeon general, “A residential treatment center (RTC) is a licensed 24-hour facility (although not licensed as a hospital), which offers mental health treatment” (Mental Health: A Report of the Surgeon General, 1999). This type of placement is commonplace for children and adolescents whose behavioral, emotional, and psychiatric needs have been deemed too complex for traditional outpatient treatments. RTCs provide treatment providers with an opportunity to work with these youth in a highly structured and supervised setting over a prolonged period the time. Additionally, the clinical complexity of these clients often results in the use of psychotropic medications as part of treatment. However, RTC clients appear to be prescribed medications at a rate much higher than that found in outpatient settings (Breland-Noble et al, 2004). Yet despite the frequency of use there is very little research on the efficacy of psychotropic medications on children and adolescents in general, and almost no research on the unique RTC population specifically (Thomas & Penn, 2002). In addition to questions about effectiveness there are also concerns about the safety of these medications, including concerns about side-effects and the impact on long-term development.

Many in the field of psychiatry have suggested providers make more efforts to observe clients removed from all medications for a period of time to better determine the clients’ baseline functioning before providing any medication (Thomas & Penn, 2002) to better evaluate and determine the necessity of pharmacological treatment. The purpose of the present study is to evaluate this type of medication protocol used at an RTC. The focus of this study is to evaluate the effectiveness of the medication protocol in reducing the use of medications in RTC clients and comparing the overall RTC effectiveness for those clients who were re-prescribed
medication, had their medication permanently discontinued, and those who were never on medication.
REVIEW OF THE LITERATURE

Prevalence Rates

*Clients in Residential Treatment*

Determining the actual number of children and adolescents placed in RTCs is difficult, but this type of placement appears to be on the rise (Underwood, Barretti, Storms, & Safonte-Strumolo, 2004). This is likely due in part to the deinstitutionalization movement of recent decades which has resulted in less utilization of inpatient psychiatric hospitals (Connor, Doerfler, Toscano, Volungis, & Steingard, 2004; Underwood et al., 2004). According to Warner and Pottick (2003) approximately 66,000 children and adolescents are placed in RTCs. Burns, Hoagwood, and Maultsby (1998) suggest that 8% of children and adolescents who receive mental health treatment do so in RTCs. Evaluation of RTCs from across the United States of America suggest that the majority of youth in RTCs are male (61%), between the ages of 13 and 17 (75%), and White (65%; compared to 21% Black and 12% Hispanic). Most adolescents placed in RTCs are referred from either a social service agency (37%) or the juvenile court system (27%; Warner & Pottick).

The number of adolescents in RTCS is separate from adjudicated adolescents placed in juvenile residential correctional facilities, which according to the Census of Juveniles in Residential Placement (CJRP) totaled 92,854 in 2006 (The Office of Juvenile Justice and Delinquency Prevention; OJJDP). However, many of the adolescents placed in RTCs are adjudicated and were provided an RTC placement in lieu of a correctional facility. Distinguishing these delinquent and non-delinquent adolescent populations is extremely challenging.
considering the hefty overlap between mental health problems and criminal activity. It is estimated that up to 60% of adolescents residing in a juvenile correctional facility suffer from at least one mental health disorder (Underwood et al., 2004) and, conversely, almost all adolescents placed in RTCs have had some involvement with the legal system (Sukhodolsky & Ruchkin, 2006).

Diagnoses in RTC Clients

In addition to criminal behavior, adolescents placed in RTCs generally exhibit severe emotional and behavioral problems. In the general population it is estimated that 15% to 21% of children and adolescents suffer from at least one psychological disorder (Underwood et al., 2004; Vermeiren, Jespers, & Moffitt, 2006). The prevalence rates are significantly higher in RTC settings. In a survey of 95 adolescent facilities, 73% of youth had “mental health problems”, with 57% having received previous mental health treatment. Another study found that up to 77% of juvenile delinquents met criteria for a mental health disorder (Thomas & Penn, 2002).

Comorbidity, defined as having two or more psychological diagnoses, has been found in over half of RTC youth with depression and anxiety disorders co-occurring in 70%, and depressive and disruptive behavior disorders co-occurring in 50% (Vermeiren et al., 2006). Connor et al. (2004) published results from a study conducted at an RTC where 92% of the adolescents admitted to the facility between 1994 and 2001 received at least one psychiatric diagnosis, 39% received two diagnoses, 32% had three diagnoses, and 20% had four diagnoses. Warner et al. (2004) found that 44% of youth in RTCs had at least two diagnoses.

Several different diagnoses are prevalent in the RTC population. Not surprisingly, many adolescents in residential settings are diagnosed with Conduct Disorder. It has been estimated that anywhere from 30% to 90% of the RTC population meet criteria for this diagnosis (Thomas & Penn, 2002). Depression is estimated to occur in 8% of adolescents in the general population
(Shoaf, 2004) whereas mood disorders range from 7% to 42% in RTC populations. Substance use disorders have been estimated to be present in approximately 62% of the RTC population, Attention Deficit/Hyperactive Disorder (ADHD) in 7% to 46%, and anxiety disorders in 8% to 36% (Garland et al., 2001; Thomas & Penn, 2002).

In delinquent populations, mood disorders are estimated to occur in 11% to 33% (Vermeiren, 2003) and Posttraumatic Stress Disorder (PTSD) in 2% to 13% of delinquent (Sukhodolsky & Ruchkin, 2006), with one study finding PTSD present in 32% of incarcerated adolescents (Steiner, Garcia, & Matthews, 1997). Even if PTSD is not diagnosed, traumatic histories are common for a large number of adolescents in out-of-home placements. For example, Connor et al. (2004) found that 47% of the RTC participants in their study had been physically abused.

Psychotropic Medications in the General Pediatric Population

Over the last several years there has been a dramatic increase in the use of psychopharmacological interventions for children and adolescents. Several studies have demonstrated that this age group represents one of the highest rates of increase in psychotropic use (Thomas, Conrad, Casler, & Goodman, 2006). One study found that of the nearly 35 million youth who visited an outpatient provider for mental health related concerns in the years 2000 and 2001, nearly 3 million (8.3%) were prescribed a psychotropic medication (10% for males). Although that number may not seem overwhelming, it represents a 191.7% increase in prescription rates compared to 1994 (Thomas et al., 2006). Safer, Magno Zito, and desReis (2003) cited national reviews of HMO and Medicaid databases that showed a 4- to 10-fold increase for antidepressants, a 36- to 153-fold increase for alpha agonists (e.g., antihypertensives, sedatives), and a 3- to 7-fold increase in stimulants between the years of 1987 and 1996; similar increases were noted for neuroleptics.
The high rates of psychotropic medication use for youth have been well documented across multiple reviews. A 1994 chart review of child psychiatrists at a university-based outpatient clinic found prescription rates ranging from 15% to 19%, with concurrent (i.e., multiple) medication rates ranging from 11% to 22%. The most common medication classes were stimulants (35% to 51%), neuroleptics (18% to 37%), and antidepressants (24% to 26%; Kaplan, Simms, & Busner, 1994). More recently, a study conducted on the prescribing patterns of child psychiatrists in New York found that, on one day in 2002, 74% of children and adolescents who visited one of eight outpatient clinics received psychotropic medication and 50% received prescriptions for two or more medications (Staller, Wade, & Baker, 2005). Another study found that 1 in 10 adolescent males who presented for psychiatric consultation with a prescribing physician were given a prescription for a psychotropic medication. A concerning finding from that study was that up to 26% of adolescents who were prescribed psychotropic medications were not given an associated mental health diagnosis (Ringel & Sturm, 2001). In 2002, over 10 million antidepressant medications were written for children and adolescents in the United States (Antonuccio, 2008). It appears that the best current estimate of overall psychotropic medication use for children and adolescents is between 5% and 15% (Handwerk, Smith, Thompson, Spellman, & Daly, 2008). Of adolescents ages 12 to 17, the estimate is roughly 6% (Ringel & Sturm, 2001; Simpson, Cohen, Pastor, & Reuben, 2008).

The practice of prescribing multiple psychotropic medications is common and increasing (Safer et al., 2003). Overall, leaders in the field of child psychiatry continue to support the use of concomitant medication use for specific indications. Yet, despite the warning of the Council of the American Academy of Child and Adolescent Psychiatry to use concomitant medications cautiously and judiciously rates remain high (Safer et al., 2003). Increases in concomitant medication use were found to range anywhere from 4% to 133% during the 1990s (Safer et al.).
Rates of concomitant medications in outpatient treatment ranged from 25% to 68% for clients with Attention-Deficit/Hyperactivity Disorder (ADHD; Safer et al.), 39% for Obsessive Compulsive Disorder (OCD; Geller, Biederman, Reed, Spencer, & Wilens, 1995), and 71% for Bipolar Disorder (Biederman et al., 1998), with one study finding an average of 3.2 psychotropic medications for children and adolescents diagnosed with Bipolar Disorder (Bhangoo et al., 2003). Kumra et al. (1996) found that adolescents diagnosed with Schizophrenia were prescribed a mean of 2.1 psychotropic medications. Concomitant rates were found to range from 17% to 20% for students in special education classrooms (Safer et al., 2003), 45% for youth in foster care (Zima, Bussing, Creculius, Kaufman, & Belin, 1999), and 52% for children considered wards of the state (Anderson, Naylor, Kruesi, & Stoewe, 2002; cited in Safer et al., 2003). Several studies reviewed by Safer et al. (2003) found that the antihypertensive clonidine and methylphenidate were the most common medication combination for children and adolescents. Stimulants and antidepressants were found to be an especially common combination for youth with aggression problems. Pathiyal, Miwa, Sverdiov, Gardner, and Jones (1998; cited in Safer et al., 2003) found that 22% of clients prescribed methylphenidate (e.g., Ritalin) were also prescribed an antidepressant. Conversely, 30% to 33% of youth prescribed an antidepressant also received a stimulant (Rushton & Whitmire, 2001; Zito et al., 2002).

**Psychotropic Medications in RTCs**

Although the rates of psychotropic medication use in the general youth population is high, the prevalence in out-of-home placements is staggering. Najjar et al. (2004) conducted a study of children and adolescents in an inpatient treatment facility during two distinct time periods. The researchers found that in 1991 14% of clients were admitted on psychotropic medications and 40% were discharged on medications. In 1998 46% were admitted on medications and 75% were discharged on medication. A study published in 1994 examined the
medication use at four state-run inpatient hospitals and found a prevalence rate of 98% (Zito, Craig, & Wanderling, 1994).

Connor, Ozbayrak, Harrison, and Melloni (1998) evaluated the medication utilization at an RTC. The study included 83 children with a mean age of 14, mostly male, Caucasian, and a mean full scale IQ score of 78. The researchers found that 76% of the adolescents were receiving medications at admission, with 40% receiving two or more medications. Furthermore, a chart review revealed that 57% of the total sample had received at least one trial of multiple medications prior to admission. The most common medications were neuroleptics (35%), followed by sedative-hypnotics (26%), antidepressants (22%), mood stabilizers (16%), anticonvulsants alone (14%), and antihypertensives (7.2%). The authors noted that the prevalence of these medications was greater than the prevalence of their diagnostic indications, suggesting a large degree of off-label prescribing (i.e., for an unapproved use). The chart review of past multiple medication trials revealed an average of 1.9 medications with 52% taking two medications, 29% taking three, 11% taking four, and nearly 8% taking five medications. The most common medication combination was a neuroleptic and lithium (26%) followed by a neuroleptic and antidepressant (19%).

In a study done in Tennessee in 2004, 40% of adolescents (ages 13 to 18) in state custody were taking at least one prescription medication. The study also found that 65% of children and adolescents placed in residential treatment facilities were prescribed psychotropic medication; this percentage was significantly higher than other types of placements such as group and foster homes (Bellonci & Henwood, 2006). However, another study found that approximately 67% of youth in therapeutic foster homes and 77% of youth in group homes took psychotropic medications (Breland-Noble et al., 2004). A review of Medicaid files in Connecticut revealed that youth taking psychotropic medication were more likely to be in state
custody, male, and less likely to be African American or Hispanic (Martin, Van Hoof, Stubbe, Sherwin, & Scahill, 2003).

Warner et al. (2004) published a comprehensive study on the use of prescribed psychotropic medications among youths involved in the adolescent mental health system (which included inpatient, community outpatient, and residential treatment facilities). They found that approximately one-third of all youths in the system were prescribed a psychotropic medication. The rates of medication usage were highest in inpatient settings (76%), followed by residential centers (59%). This study found that 13.9% of youth who were prescribed psychotropic medications were apparently not given any mental health diagnosis. The study also found that nearly 29% of youths with one diagnosis and 40% of youths with two diagnoses were prescribed psychotropic medication. The most common diagnosis for youth taking medication was ADHD, followed in order by Conduct Disorder, Adjustment Disorder, mood disorders, and anxiety disorders. The researchers also investigated the percentage of youth taking medication based on diagnosis: 66% with psychotic disorders, 52% with ADHD, 44.5% with a mood disorder, 32% with an anxiety disorder, and 28% with Conduct Disorder. Sixty-seven percent of youth dually diagnosed with ADHD and an anxiety disorder and 57% of youth dually diagnosed with ADHD and Conduct Disorder were prescribed at least one psychotropic medication.

The actual number of adolescents in RTC treatment receiving pharmacological intervention is difficult to determine. However, it appears the best overall estimate is that two-thirds to three-fourths of youth in RTCs are prescribed at least one psychotropic medication (Breland-Noble et al., 2004; Warner et al., 2004).
Treatment Effectiveness

Residential Treatment Centers

The RTC population is a diverse and clinically complex population that presents many challenges for treatment. Studying the treatment effectiveness of RTCs is also difficult. Several studies have been published on the effectiveness of residential treatment centers, although it is often difficult to make comparisons as the outcome criteria used vary dramatically. Some studies have been focused on specific symptoms and disorders. For example, Rohde et al. (2004) conducted a study evaluating the effectiveness of a CBT-based RTC for 93 adolescents dually diagnosed with Major Depressive Disorder and Conduct Disorder. The treatment consisted of common CBT components such as mood monitoring, behavioral activation, relaxation, cognitive restructuring, communication, and conflict resolution. Results indicated that at posttest 39% of adolescents in the CBT group displayed significant decreases in depressive symptoms (compared to 19% of adolescents in a skills-group). However, these symptom reductions were not maintained at 6- and 12-month follow ups. Ahrens and Rexford (2002) evaluated a brief group intervention for juveniles in an RTC diagnosed with PTSD. Four weeks following the intervention, the participants demonstrated reductions in depressive and PTSD symptoms compared to a waitlist control group.

Lyons, Terry, Martinovich, Peterson, and Bouska (2001) conducted a 2-year multisite longitudinal study with 285 adolescents involved in residential treatment. The researchers evaluated multiple areas of treatment effectiveness including psychological symptom presentation and risk behaviors. Results indicated that, in general, residential treatment was effective at reducing risk behaviors, reducing symptoms of depression, and improving management of psychosis. However, there was no clear indication that the RTCs were particularly effective at improving overall functioning. Furthermore, the researchers found some
evidence to suggest that adolescents placed in RTCs may experience increased levels of anxiety and hyperactivity. The researchers suggested that the RTCs were somewhat more effective at treating emotional disorders (such as PTSD) as opposed to more behavioral disorders (such as Conduct Disorder). This research contained no follow-up study and specific treatment components were not discussed.

Other studies have focused on functioning after discharge from RTCs, dating back as early as the 1970s. Weinstein (1974) reviewed the effects of an RTC for 122 adolescent males. The researcher gathered data at admission, discharge, and 6- and 18-month follow ups. The study also included a comparison group of untreated adolescents with emotional and behavioral problems and a control group of adolescents from the community. At discharge, roughly 90% of the adolescents from the residential center were rated “moderately” or “much improved”. Although the ratings diminished somewhat at the follow-up periods, the adolescents still demonstrated fewer severe problems than the comparison group. Gamboa (1974) assessed 116 children and adolescents admitted to a residential treatment center in Kentucky. Findings indicated that the treatment facility was effective in reducing difficulties in personal, school, and family areas. Unlike in other studies, these gains were maintained at a 6 month follow up. Palmer (1974) examined the effectiveness of a residential program compared to a community-based treatment group. The RTC was largely based on behavioral principles. The outcome criterion was recidivism. The results indicated that 58% of the juveniles in the residential group were re-arrested, compared to 94% of the adolescents in the community-based treatment group.

In another early study, researchers followed 51 children discharged from an RTC. Results indicated that at follow up, only 30% of the children met the criteria for a positive outcome: less than 3 out-of-home placements after discharge, absence of severe psychiatric or legal problems,
and absence of psychiatric hospitalization. Those children that were considered to have a positive outcome were generally younger and less severely disturbed at admission. As should be apparent, the criteria for “success” in this study was set relatively low (Lewis, Lewis, Shanok, Klatskin, & Osborne, 1980). Gilliland-Mallo and Judd (1986) conducted a similar study with adolescents in an RTC in Colorado. They found 62% of their sample met criteria for a positive outcome: placement in a family home, foster care, group home, or some other residential facility. An unsuccessful outcome was defined as placement in detention center or termination of a placement. The authors also noted several variables that were related to success: race (white versus other), absence of court involvement prior to admission, absence of drug abuse history, and family involvement in treatment.

In another study, researchers followed adolescents who had either been involved in a therapeutic day school or a residential program. The authors reported that, 10 years later, there were no notable differences based on placement (day school versus residential). Overall, nearly two-thirds of the participants were “better adjusted” at follow-up. The authors noted that, in general, the participants who were the least disturbed at admission were functioning best at follow-up (Erker, Searight, Amanat, & White, 1993). Burks (1995) conducted a 6 month follow-up study of children in an RTC and found that 50% achieved positive outcomes at follow-up. The authors noted that the stability of the post-treatment placement was most strongly related to post-discharge functioning.

Leichtman, Leichtman, Barber, and Neese (2001) conducted 3- and 12-month follow up evaluations of 123 adolescents from an RTC in Kansas. The authors reported that 79% of the adolescents made reliable improvements in general functioning and 43% made improvements on a self-report measure of behavioral functioning. Further, these changes were noted and maintained at both follow-up periods.
Researchers attempted to create a risk-adjusted outcome assessment of several RTCs using existing data from the Public Child and Welfare System in Missouri. In total, 3,759 RTC stays were included for 2,784 children and adolescents. Although the primary focus of the research was not obtained, they did report a few concerning findings. For one, over half of the youth were admitted for a second residential stay within a year of discharge from their first stay. Overall, only around one-fourth of youth were able to be maintained at a single lower level-of-care placement for the year following discharge (McMillen, Lee, & Jonson-Reid, 2008).

Pfeiffer and Strzelecki (1990) conducted a meta-analysis of 34 outcome studies of child and adolescent RTCs. The authors suggested that individualized treatments and client involvement in aftercare predicted positive treatment outcomes. The authors also stated that positive treatment outcomes were more likely for clients who had less severe, nonorganic symptoms, clients without antisocial features, and clients who had “healthier” families. In 2005, Hair published a comprehensive literature review on residential outcomes studies from 1993 to 2003. The researcher concluded that residential treatment is generally effective at reducing symptomology and improving behavioral functioning, although these positive treatment effects are not always maintained once clients return to less restrictive environments. Based on the review, the researcher identified several factors that are potentially related to positive treatment outcomes including family involvement in treatment, stable aftercare setting, aftercare support for the youth and their families, shorter lengths of stay in RTCs, academic success while at the RTC, and successful completion of the RTC program. Handwerk et al. (2006) also suggested that females may have a more favorable response to long-term residential treatment than males.
Psychotropic Medications

Unfortunately, there is little to no research on the effectiveness of psychotropic medications with adolescents in RTCs (Shoaf, 2004). Although more studies are being conducted with adolescents in general, these studies are almost exclusively limited to outpatient settings with small sample sizes, narrow diagnostic criteria, and are of short duration (McCellen & Werry, 2003; Thomas & Penn, 2002). A brief review of psychotropic medications studied for use with the general child and adolescent population will be described here. For a more thorough review see Soller, Karnik, & Steiner (2006).

Stimulants. Several stimulant medications have been given FDA approval for the treatment of ADHD including the amphetamines Adderall and methylphenidates such as Concerta, Dexamphetamine, and Ritalin. Although not a stimulant, atomoxetine hydrochloride (Strattera) has also received FDA approval (U.S. Food and Drug Administration [FDA], 2009).

Stimulant medication has generally been found to be an effective treatment for ADHD. In a combined evaluation of over 160 controlled trials of stimulant medication, 65% to 75% of children and adolescents diagnosed with ADHD demonstrated improvements. In addition to core symptoms of ADHD, stimulant medications have also been shown to be partly effective at reducing aggressive behaviors (McCellen & Werry, 2003).

In one of the largest studies to date in the area of pediatric psychopharmacology 379 children were randomly assigned to one of several treatment conditions including a behavioral therapy intervention, stimulant medication, and both behavioral therapy and stimulant medication. Results generally indicated that regularly monitored medication management was superior to all the other conditions, although the medication combined with behavioral interventions did yield a few additional areas of improvement (Jensen et al., 1999).
A meta-analysis conducted on 28 studies (from 1970 to 2001) found that stimulant medication can be effective at treating child and adolescent clients with co-occurring ADHD and aggressive behaviors (such as those common in Conduct Disorder). A combined effect size of 0.84 was reported (Steiner, Saxena, & Chang, 2003). Another meta-analysis found that stimulant medications were equally effective at treating ADHD-related aggression and core ADHD symptoms, but only if Conduct Disorder was not also present (Connor, Glatt, Lopez, Jackson, & Melloni, 2002). Another study found some support for stimulant medication on improving social functioning in adolescents with overly aggressive behaviors (Pappadopulos, Guelzow, Wong, Ortega, & Jensen, 2004). However, there has been some concern that stimulant medications may actually increase conduct disorder-related behaviors in adolescents without ADHD (Klein et al., 1997).

It should be noted that the overwhelming majority of studies done on stimulant medication are short term trials. That being said a few longer-term studies have been conducted and have generally found continued positive effects of stimulant medication for ADHD and related symptoms so long as the medication continues to be taken (Jensen et al., 2001).

Several side effects have been reported for adolescents taking stimulant medication including over half of participants of one study reporting insomnia, and several others reporting nausea, headaches, and irritable mood. A small percentage also developed tics and mild weight loss (Barkley, McMurray, Edelbroch, & Robbins, 1990). Other side-effects, albeit rare, include psychosis. One study found that 6% (n = 9) of children treated with stimulant medication at one outpatient clinic in Canada developed some form of psychotic symptom (Cherland & Fitzpatrick, 1999).

In 2006 The FDA recommended a warning label be placed on stimulant medications due to concerns of cardiovascular risks. This warning came after studies revealed that taking
stimulant medication can substantially increase heart rate and blood pressure, conditions that can lead to severe consequences, including death. The FDA’s Adverse Event Reporting System (AERS) documented 25 cases of sudden death potentially resulting from stimulant medication; of these 25 deaths 19 were children or adolescents (Nissen, 2006).

Antidepressants. Selective Serotonin Reuptake Inhibitors (SSRIs) are generally considered the frontline choice of antidepressant medication. Currently, only fluoxetine (e.g., Prozac) has been FDA approved for the treatment of pediatric Major Depressive Disorder. Fluoxetine, sertraline, and fluvoxamine are approved for pediatric OCD. SSRI medications have not been approved by the FDA for any other use. Clomipramine, a tricyclic antidepressant, has also been FDA-approved to treat OCD (FDA, 2009).

A study done on a medication not approved by the FDA for pediatric use, Citalopram, with 174 children and adolescents (ages 7 to 17) found in an 8-week study that the majority of participants showed significant decreases in depressive symptoms. The authors reported an effect size of 2.9. However, Rhinitis, nausea, and abdominal pain were side effects reported in more than 10% of participants (Wagner et al., 2004).

A few studies have been done comparing the effectiveness of psychotherapy and psychopharmacological interventions. Dubicka and Goodyer (2005) highlighted research that suggested CBT may be an effective treatment option for adolescents suffering from mild to moderate depression but may not be particularly effective, without psychotropic medication, for adolescents with severe depression. However, based on the results of their study Hamilton and Bridge (2006) determined that ongoing SSRI treatment with only episodic supportive psychotherapy was not effective at preventing recurrences of Major Depressive Episodes in adolescents. They suggest the need for evidence based psychotherapeutic practices that can produce strong therapeutic alliances and ultimately produce longer-lasting change.
One of the largest recent studies to evaluate the effectiveness of SSRIs with children and adolescents was The Treatment for Adolescents with Depression Study (TADS). The researchers claim that TADS is the only controlled study to compare psychotherapeutic and psychopharmacological approaches for adolescent depression. The study consisted of a multisite investigation of 439 adolescents suffering from depression. Adolescents were split into four groups: fluoxetine, CBT, combination, and placebo. Treatment was delivered over 12 weeks and overall findings demonstrated an advantage for the combined treatment over medication alone. Fluoxetine alone appeared more effective than no treatment. However, there was no statistical difference in symptom reduction between the CBT only and placebo groups, suggesting that CBT alone was not an effective intervention. The rates for harm-related events (such as self-harm and suicidal ideation), physical side effects (e.g., diarrhea, sedation, fatigue), and psychiatric side effects (e.g., irritability, mania) were much higher among the fluoxetine groups compared to the CBT alone or placebo group. The rates of reporting major aversive events increased in all groups when elicited through systematic questioning, although all treatment groups experienced an overall decrease in suicidality from pretest to posttest. The researchers suggest that the combination treatment approach is ideal for the treatment of pediatric depression (Antonuccio, 2008; Dubicka & Goodyer, 2005; Emslie et al., 2006).

SSRIs are commonly used to help treat a variety of psychological disorders other than depression. For example, SSRIs combined with clompiramine have been found to be an effective treatment for child and adolescent Obsessive Compulsive Disorder (OCD; Emslie, Walkup, Pliszka, & Ernst, 1999), as has the combination of fluoxetine and paroxetine in 60% to 75% of children and adolescents with OCD (Shoaf, 2004).

Some researchers have suggested that the benefits of SSRIs for adolescents have been exaggerated and the adverse affects have been ignored (Jureidini et al., 2004). One study
reported that 6 of 7 published randomized trials have found that SSRIs in children produce favorable results on at least some measures. However, it was also cautioned that methodological issues may have inflated the apparent efficacy of SSRIs. In a study commissioned by the FDA, in conjunction with Columbia University, researchers found that only 3 of 15 randomized controlled trials of newer antidepressants showed more effective results than placebo (Antonuccio, 2008).

A recent meta-analysis was conducted on randomized controlled trial, drug-placebo contrast studies on the use of antidepressants in juvenile depression. In total, the analysis included data from 30 studies and a total of 3,069 participants. The results demonstrated limited effectiveness of antidepressants in children and that antidepressants appear to be significantly less effective in treating children than adults. Overall, the researchers found minimal differences between different antidepressants, with the possible exception of fluoxetine. However, it was noted that the favorability of fluoxetine was largely the result of one large randomized trial that had an atypically large separation between treatment group and placebo. One additional finding was the overall lack of difference between SSRI and tricylic antidepressant effectiveness. However, of the 30 trials only 5 (20%) demonstrated statistically significant difference between treatment group and placebo and all 5 were SSRI studies (Tsapakis, Soldani, Tondo, & Baldessarini, 2008).

In a meta-analysis conducted in the 1990s researchers found that, overall, studies on the efficacy of antidepressant medications for children and adolescents lacked appropriate controls, were prone to experimental bias, had problematic selection criteria and outcome rating systems, small sample sizes, and a poor accounting of potentially confounding variables. In fact, the researchers noted a concerning inverse relationship between positive findings and the use of adequate experimental controls (Thurber, Ensign, Punnett, & Welter, 1995). Shoaf
(2004) also pointed out that research on adolescent antidepressant medication has shown an increasingly high placebo response rate.

There is concern that antidepressant medication may actually worsen or exacerbate psychological and psychiatric symptoms. For example, one study found that 3% to 6% of adolescents on SSRIs developed manic symptoms (Emslie & Mayes, 1999). This risk for SSRI-induced manic symptoms have also been found elsewhere (e.g., Preda, MacLean, Mazure, & Bowers, 2001). Additionally, common side-effects of SSRIs include insomnia, fatigue, agitation, gastrointestinal problems, sexual problems, decreased appetite, and possible growth suppression in children (Antonuccio, 2008; Lakhan & Hagger-Johnson, 2007). When coupled with other medications, SSRI use may have other risks, including an increased risk for Serotonin Syndrome (or Serotonin Toxicity), which is caused by excessive accumulation of serotonin in the body and can result in cognitive effects (e.g., mental confusion, hypomania, hallucinations), autonomic effects (e.g., shivering, sweating, tachycardia, nausea), and somatic effects (e.g., muscle twitching, tremors). In some cases, Serotonin Syndrome can be lethal (Dvir & Smallwood, 2008).

In 2003, the FDA released a warning that certain antidepressant medications may increase suicidality among adolescents diagnosed with depression and in 2004 required that warning labels be placed on 10 antidepressant medications. This warning came after evaluating 24 trials that included over 4,400 depressed children and adolescents. The rate of suicidality was 4% in treatment groups compared to 2% in the placebo groups. This issue remains controversial and debate continues over the significance of these findings. Additionally, many point out that SSRI medication appears to reduce overall suicide rates (Dubicka & Goodyer, 2005; Pappadopulus et al., 2004; Soller et al., 2006). Others have raised concerns that the use of the warning label may actually increase suicide rates in children as parents and treatment providers
become more reluctant to provide antidepressants to children who are in need. For example, Lineberry, Bostwick, Beebe, & Decker (2007) cited a correlational relationship between a 17% increase in child suicide rates and a 17% decrease in antidepressant prescribing. This finding is in contrast with the majority of findings that suggest an overall dramatic increase in psychotropic medications in children and adolescents (Antonuccio, 2008).

**Neuroleptics (Antipsychotics).** Despite the fact that approximately one-third of individuals with Schizophrenia experience an adolescent onset and that those with adolescent onsets tend to have more severe forms of the disorder, individuals under the age of 18 are commonly excluded from pharmacological treatment trials (Ross, 2008). Only a few antipsychotic medications have received FDA approval for pediatric populations. The only first-generation, or *typical* antipsychotic medication approved for minors is lamotrigine (Lamictal) for the treatment of seizures. A few second generation, or *atypical* antipsychotics have received FDA approval. Aripiprazole (Abilify) and Risperidone (Risperdal) have been approved to treat Schizophrenia in adolescents ages 13 to 17 and for the treatment of manic or mixed episodes of Bipolar Disorder I for ages 10 to 17. In addition, Risperidone has been approved to treat irritability associated with Autism for children 5 to 16 (FDA, 2009).

Castro-Fornieles et al. (2008) published results from a naturalistic longitudinal study of antipsychotic medication use among adolescents experiencing a first episode of psychosis. Their study included 110 adolescents (mean age = 15.5) recruited from adolescent psychiatry units at six university hospitals and who were monitored at baseline, 6 months, and 1 year. Their results found that three of the second generation antipsychotics: risperidone, quetiapine, and olanzapine were the most commonly prescribed. Clozapine was the most common second choice after other medications were shown to have limited success. Results indicated that all three antipsychotics resulted in positive effects on all outcome variables, with the exception of
resperidone in treating negative symptoms of psychosis. The authors suggested that resperidone may actually increase negative symptoms (e.g., hypokinesia and akinesia) as a medication side-effect. Weight gain was also a commonly observed side-effect, especially for olanzapine. The authors noted that the weight gain observed in their study was greater than that commonly reported in more short-term trials. They caution that long-term use of these antipsychotics may place children at an increased risk for insulin resistance, diabetes, hypertension, or cardiovascular disease. Resperidone was noted to cause more neurological side-effects. It should be noted that that overall neither the doctors nor patients reported that the observed side-effects caused marked disturbance in everyday life. This study is advantageous compared to other studies in that it observed long-term effects of the medication. Limitations include the lack of randomized samples or controls, and selection-bias for the different medications as the study was naturalistic.

Ross (2008) reported the findings of two recent studies on the effectiveness of antipsychotics with children and adolescents. The combined results suggested that by six weeks participants in placebo groups had a 22% symptom reduction while participants in various medication groups (molindone, olanzapine, risperidone, and aripiprazole) had symptom reductions ranging from 23% to 30%, demonstrating a relatively low treatment effect size. Furthermore, across treatment groups roughly 50% of participants demonstrated no positive responses to medication treatment. Side-effects observed included akathisia, extrapyramidal symptoms, somnolence, and tremors. Weight gain was particularly prominent in the olanzapine group, but also present in the risperidone group. Olanzapine also had several other observed side-effects including changes in heart-rate (i.e., elongated QTC intervals), and increased levels of total cholesterol.
DelBello, Versavel, Ice, Keller, and Miceli (2008) conducted a study to examine the tolerability of ziprasidone (Geodon) in 63 children and adolescents with Bipolar Mania, Schizophrenia, or Schizoaffective Disorder. The purpose of the research was to evaluate the tolerability of the drug at two fixed doses: 80mg or 160mg. Flexible dosing (20mg to 160mg) was included after initial evaluation of the fixed dosing levels. Although efficacy was not the focus of the study, the researchers commented that ziprasidone was generally effective with overall symptom reduction. However, side-effects such as sedation, somnolence, headaches, and nausea were observed in 20% to 30% of participants in both the fixed-dosage and flexible-dosage phases. Movement disorders were prevalent in 22% of participants in the fixed dosage condition and only reduced to 16% when flexible dosing was allowed. Over a third of participants gained greater than or equal to 7% of their baseline weight, a finding that is generally higher than those reported with adults on ziprasidone. The authors also noted that 13 participants experienced serious symptoms (e.g., suicidal ideation, exacerbation of mania or hallucinations); however, the authors attributed this finding to limited effectiveness of ziprasidone in treating these diagnostic-consistent symptoms as opposed to medication side-effects.

A study conducted in Germany on the long-term weight gain potential of three antipsychotic medications found that adolescents on all three medications experienced significant weight gain, greater than that typically reported for adults. After 45 weeks the average weight gain was 20.9 pounds for clozapine, 15.9 pounds for risperidone (e.g., Risperdal), and an alarming 35.7 pounds for olanzapine (e.g., Zyprexa). Limitations of this study included an inability to rule-out weight gain as the result of previous medication treatment, small sample sizes, and a lack of a control group. The lack of control is particularly noteworthy considering
that the adolescents being observed were in a long-term inpatient facility, most of which do not allow for high levels of physical activity (Fleischhaker et al., 2008).

Antipsychotic medications are commonly used to treat conditions other than psychotic disorders. Several published reviews have found antipsychotics to be efficacious in reducing symptomology associated with a variety of disorders including Bipolar Disorder, Pervasive Developmental Disorder, Autism, and Tourette’s Syndrome, and probably efficacious in treating ADHD, Conduct Disorder and aggression, and Mental Retardation. Overall, the studies reviewed found positive results, typically in reduction of aggressive behaviors, tics, self-injurious behaviors, and positive symptoms of psychosis. However, neuroleptics are known to cause a wide variety of side-effects including weight gain, extrapyramidal symptoms or movement disorders including tardive dyskinesia, metabolic conditions, and may trigger additional psychotic or manic symptoms. Furthermore, it should be noted that many of the published studies were conducted in the 1980s, with small sample sizes and open trials. Several researchers have cautioned that more current and empirically sound research is needed (Castro-Fornieles et al., 2008; Cheng-Shannon et al., 2004; DelBello et al., 2008; Fleischhaker et al., 2008; McCellen & Werry, 2003; McCracken et al., 2002; Robinson, Woerner, Delman, & Kane, 2005; Soller et al., 2006).

Mood Stabilizers/Anticonvulsants. The use of medications as mood stabilizers in adolescent populations has increased, likely in response to the increase in adolescents being diagnosed with Bipolar Disorder (McCellen & Werry, 2003). Lithium remains the primary treatment of choice for pediatric Bipolar Disorder and is currently the only non-antipsychotic medication approved to treat Bipolar Disorder (FDA, 2009). As Pappadopulos et al. (2004) pointed out, despite the fact that Lithium has been given FDA approval for the treatment of Bipolar disorder in adolescent populations there is a surprising lack of empirical support for its
use. Furthermore, like neuroleptics, the small numbers of studies that have been conducted on mood stabilizers were generally done in the 1980s.

Recent research on the effectiveness of Lithium has been mixed. In a placebo controlled study on Lithium use for adolescents diagnosed with primary mood disorders and secondary substance dependency, Geller et al. (1998) found that those in the Lithium condition had better scores on a global assessment measure. Additionally, Lithium appeared helpful in reducing cravings related to substance abuse. However, no difference was found between Lithium and placebo on manic symptoms. In two studies published in 2001, the positive therapeutic effects of Lithium were significantly reduced once augmented antipsychotic medications were discontinued (Kafantaris, Coletti, Dicker, & Padula, 2004).

Kafantaris et al. (2004) published what is reported to be the first placebo-controlled study on the efficacy of Lithium in treating adolescents with short term mania. In the study all participants (N = 40) were placed on Lithium for at least four weeks, and then randomly assigned to continue on Lithium or placebo during a 2-week double-blind, placebo-controlled phase. Results from the initial phase of treatment were positive and indicative of a significant decrease in symptomology with minimal side-effects. However, results during the subsequent 2-week double-blind phase indicated that over half (57.5%) of participants experienced exacerbated symptoms with no statistical difference noted between the treatment and placebo group. In fact, 11 of the 40 subjects terminated after 1 week of the double-blind phase due to clinically significant exacerbation of symptoms. Of the participants who remained on Lithium during the double-blind phase, less than half sustained the positive response noted in the initial open-trial phase. One possible explanation for the exacerbation of symptoms noted in the double-blind phase is that the majority of adolescents included in the trial were initially involved
in inpatient treatment, but most were released from the hospital by the time of the double-blind phase and therefore exposed to psychosocial stressors.

Lithium, as well as other mood stabilizing drugs, are known to cause several side-effects. The most common side-effects noted for Lithium are gastrointestinal problems, polyuria, polydipsia, enuresis, dizziness, weight gain, and fatigue. More severe side-effects that occur include hypothyroidism and cardiac conduction abnormalities. Additional side-effects have been noted when Lithium is used with other medications. Overall, side-effects for Lithium and other mood stabilizers are common, but generally mild to moderate, although dangerous and even fatal side-effects can occur (Lopez-Larson & Frazier, 2006).

Research on other medications for the treatment of adolescent Bipolar Disorder has been conducted. Dineen Wagner et al. (2002) evaluated the effectiveness of divalproex sodium (Depakote) in 40 children and adolescents ages 7 to 19 with manic, hypomanic, or mixed-episode Bipolar Disorders. Slightly over half of participants demonstrated a positive response to the medication. Side-effects were generally rated mild to moderate and included nausea, vomiting, diarrhea, and somnolence. The study was limited by a high drop-out rate.

In another study, researchers evaluated the efficacy and tolerability of quetiapine (Seroquel) and divalporex (DVP; iDepakote) in treating acute mania in adolescent Bipolar Disorder. The sample consisted of 30 hospitalized adolescents ages 12 to 18. Results from the 6-week trial suggested that the drugs in combination produced greater symptom reduction than divalporex combined with placebo. The most common side-effects in both treatment groups were sedation, nausea, headaches, weight gain, and gastrointestinal irritation, with all side-effect severity ratings between mild and moderate. Sedation was the only side-effect more prominent in the combined treatment group. Advantages of this study include the double-blind
design and use of placebo. Limitations of this study include its short duration and small sample size (DelBello, Schwiers, Rosenberg, & Strakowski, 2002).

Mood stabilizers have also been used to treat other conditions. Silva, Munoz, and Alpert (1996) conducted a meta-analysis on the use of the anticonvulsant medication carbamazepine and found some support for its use in adolescents diagnosed with ADHD. A study done with 40 adolescents diagnosed with conduct disorder found that Lithium helped improve judgment and decrease overt aggression. However, several side effects were also common (Malone, Delaney, Leubbert, Cater, & Campbell, 2000). Soller et al. (2006) reviewed several research findings that also suggest that some mood stabilizers (as well as some atypical antipsychotics) may be effective in the treatment of Conduct Disorder, especially symptoms of aggression and impulsivity.

Overall, mood stabilizers have been shown to be somewhat effective at reducing mood instability, aggressiveness, and impulsivity across various psychiatric disorders. In treating Bipolar Disorder, mood stabilizers appear to be more effective when used in combination with an antipsychotic. Several newer mood stabilizing medications have been increasingly used to treat adolescent populations, but there is a noted lack of research (Lopez-Larson & Frazier, 2006). Common side effects include drowsiness, headache, dizziness, ataxia, somnolence, nausea, diarrhea, gastrointestinal symptoms, and weight gain. Other concerns include cardiac arrhythmias, acute myopia, blood dyscrasias (Carbamazipine), Stevens-Johnson Syndrome (Lamotrigine), and panceatitis and liver failure (Valproate). Additionally, there is some worry regarding potential birth defects, raising concern when using mood stabilizers for sexually active females (Weller, Kloos, Hitchcock, & Weller, 2005).

Concomitant Medications. Very few studies have been published to examine the safety and efficacy of concomitant medication in adults and almost no research has been done with
children and adolescents. In adult studies the risk of adverse side effects has been shown to increase with the number of concomitant medications, suggesting the need for caution when using multiple medications (Safer et al., 2003). Some single study results have indicated that methylphenidate and either desipramine or thioridazine may produce modest improvements in ADHD symptoms, but may also cause impaired vigilance and other side effects. Combining Clonidine with methylphenidate did not produce any improvement over methylphenidate alone (Safer et al.).

**Medication Reduction/Discontinuation in RTCs**

A review of the literature yielded only a handful of studies that specifically addressed medication discontinuation or reduction in residential settings. A recent study evaluated the residential care of 116 children and adolescents originally admitted to a stabilization unit and subsequently referred to residential centers or group homes. Seventy-five percent of those placed in residential treatment successfully transitioned to community placements. Although not the focal point of the study, the researchers commented on medication use as an indicator of treatment success. They noted that 53% of the 116 participants were taking one or two psychotropic medications at admission, 31% were taking three or four medications, and less than one percent was taking five or more. At the time of admission, only 11 participants were on no medication; this was increased to 23 individuals at discharge. The number of medications was reduced for 51 of the individuals and only increased for 22 individuals (Page, Perrin, Tessing, Vorndran, & Edmonds, 2007).

Connor and McLaughlin (2005) conducted a naturalistic observation of the medication use of adolescents in a residential treatment facility. None of the adolescents had their medications altered for the purpose of the study, but rather based on decisions by a team of psychiatrists. The reserachers reviewed the files of all 141 adolescents admitted to the RTC
between 1992 and 2001. Of those, 112 (79%) were admitted on psychotropic medication and 64 (45%) of those clients were receiving more than one psychotropic medication, with an average of 2.6 medications. Of the 112 admitted on medication, 74 (66%) youth were discharged on less medication while the remaining 34% had no medication reduction from admission to discharge. Neuroleptic, antipsychotic, antidepressant, anticonvulsant, lithium, and clonidine use were all significantly diminished at discharge, whereas stimulant medication remained constant from admission to discharge. The number of adolescents discharged without any medication was 40, up from 29 at admission. Only 8 of the individuals admitted without medication were prescribed medication at the RTC. The number of adolescents taking concurrent medications dropped from 78% at admission to 48% at discharge. These results are encouraging and suggest that medication reduction can be very effective, at least in a structured setting. However, it should be noted the majority of clients admitted with psychotropic medications continued to require medication treatment at discharge and that no mention was given as to the treatment effectiveness of the RTC.

Handwerk et al. (2008) published a retrospective analysis of the treatment effectiveness at a large RTC with specific focus on medication use. The sample included over 1,000 youth at the RTC between 2001 and 2004. The average age was 15, mostly Caucasian, and nearly half were referred to treatment by their families. At admission 40% of the participants were taking medications (60% antidepressants, 42% stimulants, 31% antipsychotics, & 19% mood stabilizers) and 18% were taking multiple medications. Youth admitted on medications endorsed more distress on self-report measures (including suicidality), had higher average IQ scores, and were more likely to be Caucasian than those admitted without medication. Additionally, youth admitted on medication were more likely to exhibit behavioral problems during treatment. Of the roughly 60% of youth admitted without medications, nearly 15% were placed on medication.
during treatment. At discharge, a total of 26% of youth left the RTC on medications, 80% of which were those admitted on medications. The number of youth discharged on multiple medications decreased from 18% to 11%. At discharge, there were no differences in medication status by ethnicity. Youth discharged on medications tended to be younger, had shorter length of stays, and achieved less treatment goals. At follow-up (3 or 6 months) youth admitted on medications were more likely to be attending school regularly or have graduated than those admitted without medications. The youth who left treatment on medication were more likely to have been formally placed in additional out-of-home placements, including other treatment facilities.

These results suggest that the RTC was successful at reducing the rates of medication utilization, although this was not stated as a specific goal or intention. The researchers noted that youth discharged without medication reached more treatment goals and were more likely to succeed post-treatment. This finding, combined with the finding that youth discharged on medication had shorter lengths of stay, may suggest that youth leaving the facility on medications were more difficult to treat and/or required a more intensive level of care. It should be noted that the rate of medication utilization at admission (40%) of this study is lower than other published studies, possibly suggesting some differences in sample characteristics. Furthermore, the authors noted that none of the youth at the RTC were diagnosed with psychotic disorders. Noted study limitations included the use of archival data, missing data, and a potentially higher functioning RTC population compared to other RTC clients.

As should be clear, RTCs and psychotropic medications are common and appear on the rise. This trend is occurring despite the lack of clear support for either treatment modality. RTC treatment appears to produce modest treatment effects, although multiple outside variables influence the long-term success. Research on the use of psychotropic medication for children
and adolescents is conflicted at best. Only a limited number of medications have been FDA approved for use in pediatric populations and even those medications appear to produce only modest results with risk of side-effects. Furthermore, many questions have been raised regarding the methodological integrity of pediatric psychopharmacological research. The lack of research done on child and adolescent psychopharmacology is partly due to a lack of funding for expensive controlled medication trials in children and a lack of incentive for the pharmaceutical industry to develop drugs in pediatric psychopharmacology (Jensen et al., 1999). Of the few well controlled studies done, results indicate that the therapeutic benefit is often questionable relative to the number of side effects (McCellen & Werry, 2003).

The lack of research on the effects of psychotropic medications with adolescents in out-of-home placements is particularly concerning given the severity and complexity of symptoms prevalent in the population (Handwerk et al., 2008). Although more studies are being conducted with adolescents in general, these studies are almost exclusively limited to outpatient settings with small sample sizes (Thomas & Penn, 2002). Furthermore, despite the frequency with which residentially placed adolescents are put on multiple medications, few controlled studies have assessed for the efficacy and safety of combining two medications and no controlled studies were found on the use of multiple medications for children and adolescents (Connor & McLaughlin, 2005).

Purpose of the Current Study

The use of psychotropic medication is a common component of residential treatment. Yet the lack of supportive research and potential risk raises the question of whether psychotropic medicine is a necessary component. At the very least, it seems reasonable that RTCs evaluate the rate and quantity of psychotropic medications being given to residential clients.
Some psychiatrists have suggested that prescribers institute a one month observation period wherein clients are completely discontinued from all psychotropic medication to establish a baseline and assess for clear-cut target symptoms. Then the determination regarding the appropriateness of psychopharmacological interventions can be made (Thomas & Penn, 2002). The purpose of the present study is to evaluate the medication protocol and overall treatment effectiveness of an RTC that utilizes this type of observation period. To the author’s knowledge this is the only study done to specifically evaluate a medication reduction protocol at an RTC. Analysis will be done using archival data on medication utilization, demographics, and symptomology at admission, during treatment, at discharge, and at follow-up. The specific focus of the study is to compare the RTC treatment effectiveness between three groups: those who were admitted without medication (no medication group), those admitted on medications that were subsequently removed during the observation period (discontinued medication group) and those admitted on medications that were placed back on medications after the observation period (true responder group). A fourth group, those admitted without medication but subsequently placed on medications at the RTC, is expected to be too small in number to be analyzed separately. Any youth in this fourth category will be included with the true responder group. It is hypothesized that no significant differences will be found between the three groups on in-treatment, post-treatment, or follow-up indicators of treatment success, thus suggesting that the reduction protocol was effective in identifying those who truly require medication to be successful and those who are able to reach treatment goals without medication.
METHOD

Setting

St. Mary’s Home for Boys is located in the Northwestern United States and is designed for adolescent males between the ages of 10 and 17, although a few clients remained at the RTC until age 21. The treatment protocol is defined as a Cognitive Behavioral Interpersonal program. The treatment team includes trained support staff, master-level therapists and counselors, a board certified child and adolescent psychiatrist, a licensed psychologist, and doctoral level psychology practicum students. Clients are monitored throughout the day and progress is measured via an established token economy level system. Treatment components include individual, group, family, and milieu therapy focused on symptom reduction, increased use of effective coping skills, improved rational decision making and problem solving, reduction in common “thinking errors” or “irrational thoughts”, and increased pro-social behaviors. Additionally, specialized treatment protocols exist for clients with histories of sexual offending, trauma, drug and alcohol abuse, and fire-setting. An onsite alternative school provides educational instruction and assistance and a transitional living program is also located onsite to help selected clients better transition back into the general community.

Prior to admission extensive biopsychosocial histories are prepared. Within a month of admission objective self-report assessment measures, generally administered by doctoral level practicum students, and observer report measures are completed for each client. The self report measures are the Multidimensional Anxiety Scale for Children (MASC), Minnesota Multiphasic Personality Inventory for Adolescents (MMPI-A), and Trauma Symptom Checklist for Children
The Conners’ Parent Rating Scale (CPRS-R:L) is completed by RTC direct-care staff as an observer measure. Within the first month each client meets with the RTC’s licensed clinical psychologist who reviews all biopsychosocial and assessment information and conducts a clinical interview. The psychologist then provides diagnoses based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) and individualized treatment recommendations.

Within the first month of residency each client meets with a board-certified child and adolescent psychiatrist. For those admitted on psychotropic medication, the psychiatrist initiates the medication observation and discontinuation period. The medication reduction protocol was initiated in 2000 due to observed concerns that an alarmingly high percentage of adolescents were being admitted on medication and those adolescents appeared to have more difficulty with program compliance. The protocol is used for clients admitted with a regimen of medication(s) in place. They are first assessed while on medication using standardized symptom measures. Then, the psychiatrist initiates the discontinuation period. As medications are being discontinued the psychiatrist, as well as direct-care staff, monitor the clients for behavioral, emotional, and psychological functioning. The psychiatrist typically meets with the clients weekly during the medication discontinuation period and utilizes a modified version of the Brief Psychiatric Rating Scale-Extended Version (BPRS-E) to assess for symptomology. For stimulant medication, symptoms are monitored with the Conners’ Global Index (not included in this study). After roughly a period of one month of discontinued medication the psychologist, in collaboration with counselors and mental health therapists, reviews the client’s progress and current functioning. If determined that performance is refractory to the RTC interventions the client is returned for psychiatric evaluation. The need for medication initiation, modification,
reduction, or discontinuation can be revisited at any point during the client’s stay at the RTC (S. L. Henry, personal communication, February 27, 2003).

Clients are discharged from the RTC on one of three statuses: planned (i.e., successfully graduated from the RTC), removed (i.e., removed from the program by an outside agency or parent), or terminated (i.e., relocated to an alternative placement after a determination by the treatment team that the client is not appropriate for the RTC setting). For the purposes of this study, the removed and terminated clients were combined to form an unplanned group. Clients are given a planned discharge from the RTC once they have successfully reached their treatment goals. Discharge assessment measures, the same assessments used at admission, are again administered to the clients during the final month of treatment to assess for change. After discharge all clients and/or guardians, regardless of discharge status, are contacted by phone for a structured follow-up interview at 3 months, 6 months, and 12 months post-discharge.

Instruments

*Multidimensional Anxiety Scale for Children* (MASC; March, 1997). The MASC is designed to assess a variety of anxiety symptoms in children and adolescents ages 8 to 19. It consists of 39 items on a 4-point Likert-scale. The measure has been well normed. Mean alpha coefficients have been reported at .65. The MASC has also demonstrated some internal validity and good discriminant validity (Plake, Impara, & Spies, 2003). At the RTC, the MASC is also given at admission and discharge. For the current study the four primary clinical scales will be used in analyses: physical symptoms, harm avoidance, social anxiety, and separation/panic.

*Minnesota Multiphasic Personality Inventory for Adolescents* (MMPI-A; Butcher et al., 1992). Originally published in 1992, the MMPI-A is the most used and researched personality assessment for adolescents (Archer & Handel, 2001). It consists of 478 true/false items and has been extensively normed for adolescents ages 14 to 18. Median test-retest reliability has been
reported at $r = .80$ and alpha coefficients for the clinical scales range from .71 to .91 (Plake et al., 2003). The MMPI-A has also demonstrated good convergent validity when compared to the MMPI, the MMPI-II, clinical interviews, and counselor ratings (Cashel, Rogers, & Sewell, 1998; Toyer & Weed, 1998). The MMPI-A has further demonstrated good convergent validity with several measures and indicators of juvenile delinquency (e.g., Cashel et al., 1998; Morton, Farris, & Brenowitz, 2002; Pena, Megargee, & Brody, 1996; Toyer & Weed, 1998). At the RTC, the MMPI-A is administered at admission and discharge. For the present study, all 10 basic clinical scales and the three primary validity scales will be used.

*Trauma Symptom Checklist for Children (TSCC; Briere, 1996).* The TSCC is designed to measure chronic posttraumatic stress and related psychological symptomology in children and adolescents ages 8 to 16. It consists of 54 items answered on a 4-point Likert-scale. It was based on a large normative sample. Mean alpha coefficients have been reported at .84. The TSCC has also demonstrated moderate correlations with similar measures, providing some evidence for convergent validity (Plake et al., 2003). At the RTC, the TSCC is given at admission and discharge. For the present study the six primary scales will be included in the analysis: anxiety, depression, anger, PTSD, dissociation, and sexual concerns.

*Conners Parent Rating Scale-Revised (CPRS-R; Conners, Sitarenios, Parker, & Epstein, 1998).* The CPRS-R is designed to obtain parent or caregiver report of childhood behavior problems, with specific focus on ADHD and common comorbid ADHD symptoms. It can be used for children ranging from ages 3 to 17. It consists of 80 items scored on a 4-point Likert scale. The revised scales were normed on a sample of over 8,000 children and adolescents in North America. Internal consistency has been demonstrated with coefficient alphas ranging from .75 to .94 for males. Convergent validity with psychologist or psychiatrist diagnoses have been well established (Conners et al., 1998). At the RTC the CPRS-R is completed by trained support staff.
during the first and last month of treatment for each client. In the current study the following scales will be used: Oppositional, Emotional Lability, Conners’ Global Index, DSM Inattentive, and DSM Hyperactive-Impulsive.

**Brief Psychiatric Rating Scale-Extended Version (BPRS-E; Lukoff, Nuechterlien, & Ventura, 1986).** The BPRS-E is a symptom inventory consisting of 24 items answered on a 7-point Likert-Scale, ranging from “not present” to “extremely severe”. The extended version is modified from the original, developed by Overall and Gorham in 1962. The measure used at the RTC is a slightly modified version of the BPRS-E. The first 13 items are done in a semi-structured clinical interview format. The remaining 11 items are observer ratings. Inter-rater reliability has been reported for similar versions to range from .80 to .95 (Ligon & Thyer, 2000). Internal validity has also been demonstrated (Thomas, Donnell, & Young, 2004). At the residential facility, the BPRS-E is administered as directed by the psychiatrist roughly once a week, typically for four weeks, during the medication discontinuation period. It should be noted that stimulant medication is monitored via an alternative measure (not included in this study). For the current study, the total score from the first and last BPRS-E administration will be used.

**Average Large minus Continuous Index (LCI).** The LCI is an index score developed by the RTC to track the number of large-scale misbehaviors (e.g., violent or criminal acts) versus the number of smaller misbehaviors (e.g., talking out in class) exhibited by adolescents while at the treatment facility. Scores range from a -30 to +30 and are calculated weekly, with positive scores indicating more large scale misbehaviors than smaller misbehaviors. For the current study the overall average LCI score will be used.

**Program Compliance Index (PCI).** The PCI is an index score developed by the RTC to measure adolescents’ level of behavioral compliance with program expectations while at the facility. Client behaviors are tracked throughout each day on a token economy card. The points
earned are totaled daily and a PCI score is calculated each week. Scores range from 0 to 1000. Scores from 101 to 1000 are labeled as Outstanding, scores from 30-100 are Successful, scores from 20-29 are Marginal, scores from 10-19 are Troubled, and scores from 0-9 are Critical. Used in the current study is the average weekly PCI score while the client was at the RTC.

Follow-up Questionnaire. As part of the RTC’s efforts to track outcome data, follow-up questionnaires are completed by phone with clients and/or their guardians at 3, 6, and 12 months post-discharge. The questionnaire consists of a number of items designed to assess post-discharge achievement on six domains applicable to all clients (successful living environment, successful school involvement, absence of legal problems, absence of substance abuse, active use of community resources, and positive consumer satisfaction) and two additional domains that are only applicable to certain discharged clients: active work participation (applicable if age eligible) and successful specialized program status (applicable to those clients involved in either the RTC’s sexual offender and/or fire setter programs). A total treatment effectiveness score is calculated from the follow-up questionnaires, ranging from 1-5, with higher scores indicative of greater outcome success. For the present study two domains were used: successful living environment and successful school involvement. In addition, two specific questions from other domains were included: arrests and psychotropic medication use. The total treatment effectiveness score for the 3 and 6 month follow ups were also made available and included in this study.

Procedures

Data Retrieval

General. All data was retrieved from archival electronic databases kept by the RTC. The archival data used was gathered by the RTC for purposes of case management and program evaluation. Preexisting disclosure agreements for the use of this data for research purposes
were signed by the legal guardians of each client at admission. The data was coded for anonymity by staff members at the RTC prior to being received by the primary researcher in order to protect client confidentiality and therefore no identifying information was provided to the primary researcher.

*Medication.* All information regarding medication at admission, during treatment, and discharge was provided to the primary researcher via an electronic database that specified the medication, type, and dosage. Medication information from the follow-up questionnaires were non-specific (i.e., taking medication or not). For the purposes of this study medications were aggregated into general categories of antipsychotics, stimulants, antidepressants, anticonvulsants, antihypertensives, and antianxiety/benzodiazepines. Medications used as sleep aids (e.g., Benadryl), antihistamines, PRNs (i.e., as needed), or other non-psychiatric medications (e.g., Insulin) were not included. In the current study no distinction was made between subtypes of these classifications (e.g., typical versus atypical antipsychotics, SSRI antidepressants versus SNRI or TCA antidepressants). Strattera was coded as a stimulant medication even though it is not classified as such due to its use in treating ADHD. Similarly, although not actually an anticonvulant Lithium Carbonate was coded with the anticonvulsants due to its use as a mood stabilizer. The beta-blocker Propranolol was coded as an antihypertensive. All other medications were classified based on the Physician’s Desk Reference (PDR; Thompson Corp, 2008). See Appendix A for a complete list of the medications and classifications represented in this sample.

*Diagnoses.* All diagnoses represented in the sample were based on DSM-IV-TR criteria. Diagnostic information was only available for those clients admitted on medication. Furthermore, for some participants in the sample only the primary diagnosis was made available, whereas others had secondary diagnoses listed as well. Diagnoses were grouped into
categories: mood disorders, anxiety disorders, psychotic disorders, disruptive behavior disorders (Conduct Disorder and Oppositional Defiant Disorder), ADHD, and other (e.g., Reactive Attachment Disorder, V codes, Adjustment Disorder, Substance Abuse/Dependence Disorders).

**Age.** Age at admission information was not available. Therefore, to calculate this the age at follow-up was subtracted by the follow-up period (e.g., age at 3 month follow up minus 3 months) to provide an age at discharge. The age at discharge was then subtracted by the time in treatment to arrive at an age at admission. Although the reported mean age at admission is considered to be representative, it is an estimate.

**IQ scores.** IQ scores were included in the data for both verbal and non-verbal/performance intelligence. Verbal intelligence scores were from the Verbal IQ score of the Wechsler Intelligence Scale for Children-Third Edition (WISC-III) or Wechsler Adult Intelligence Scale-Third Edition (WAIS-III), or the Verbal Comprehension Index Score of the WISC-IV. Similarly, non-verbal/performance intelligence scores were either from the Performance IQ score of the WISC-III or WAIS-III, or the Perceptual Reasoning Index score of the WISC-IV.

**Analysis**

**Preliminary analysis**

**Missing data.** Due the fact that the data used was both archival and longitudinal, a large amount of missing data was expected. *A priori* post-hoc power analysis was conducted using the software program G*power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) and indicated that the current sample sizes were large enough to provide for adequate power (.80 or greater). Therefore, no data imputation methods were used. As such, *n* sizes vary from one indicator to another for both descriptive and outcome data.

**Outliers.** All continuous variables were analyzed for outliers by standardizing scores into *Z* scores. Any data point that was greater than or equal to ± 3.0 (standard deviations) was
considered an outlier. Visual inspection of those outliers identified six data entry points that were clearly data entry errors and because raw scores were not available to the primary researcher mean substitution was used to replace those entries. The remaining outliers were changed to the closest value within three standard deviations.

**Normality.** The Kolmogorov-Smirnov and Shapiro-Wilk statistics were used to assess for univariate normality. The majority of scales were positively skewed to varying degrees. However, analysis of variance is generally considered robust to violations of normality and therefore data transformations were only used for one scale, the PCI, which had extreme skewness.

**Primary analysis.**

All analysis was done using SPSS. Categorical data was analyzed using Pearson’s chi-square. Independent and dependent sample t-tests were used for univariate two-group comparisons of mean scores. Univariate analysis of variance (ANOVA) was used for all three medication status groups (no medication, discontinued medication, true responders) for single-scale measures. For measures with multiple subscales (i.e., MASC, MMPI-A, TSCC, CPRS-R) multivariate analysis of variance (MANOVA) was used prior to univariate analysis for the scores at admission. Univariate analysis of covariance (ANCOVA) and multivariate analysis of covariance (MANCOVA) were used for the discharge scores, with corresponding admission scores as the covariates. Unless otherwise stated, all analyses conducted in the study were within acceptable ranges for the assumptions of the statistical test. Due to the number of statistical analyses conducted, a conservative alpha level of $p = .01$ was chosen *a priori.*

**Participant Characteristics**

The sample consists of archival data from an RTC for adolescent males. Data available from residents discharged from the program between 2002 and 2008 were included in the
analysis. It should be noted that 9 individuals were discharged, re-admitted, and discharged again between 2002 and 2008, providing two distinct treatment periods. For the purpose of this study each stay was considered separately. Therefore, the total sample consists of 217 distinct individuals, with 9 having two entries for a total sample size of 226 admissions. For those who were re-admitted to the RTC, certain demographic information (such as ethnicity and IQ scores) was only included once.

Age at admission ranged from 10 to 18 with an average of 14.50 ($SD = 1.41; n = 200$). Information on ethnicity was available for 184 individuals. Of those, the ethnic composition was: 73% Caucasian, 8% Hispanic, 7% Native American, 7% Biracial/Other, 5% African American/Black, and 1% Asian/Pacific Islander. Verbal Intelligence scores averaged 92.97 ($SD = 10.75, n = 144$) and non-verbal/performance intelligence scores averaged 96.35 ($SD = 12.94, n = 135$). Information on fire setting and sexual offending were available for 185 clients. Of those, 39% ($n = 72$) were deemed to have problems with fire setting and 29% ($n = 54$) had problems related to sexual offending or sexual aggression (adjudicated or otherwise).
RESULTS

Admission

Medication

Of the 226 RTC admissions, 145 (64%) adolescents were admitted on at least one psychotropic medication. Of those, 34 (23%) adolescents were taking two medications, 36 (25%) were taking three, 19 (13%) were taking four, 6 (4%) were taking five, 4 (19%) were taking six, and one adolescent was admitted on eight medications. The average number of medications was 2.48 ($SD = 1.39$). Overall, 69% of those admitted on a medication were taking at least two, with over 20% taking four medications or more. Antidepressants were the most commonly prescribed medication, followed in order by stimulants, antipsychotics, anticonvulsants, and antihypertensives. Only two individuals were admitted on a Benzodiazepine. Stimulant medications were the most commonly prescribed stand-alone medication ($n = 19$), followed by antidepressants ($n = 16$). The most common co-occurring medications were stimulants and antidepressants ($n = 56$), antipsychotics and antidepressants ($n = 45$), and stimulants and antipsychotics ($n = 37$).

Diagnoses

Diagnostic information was only available for those clients either admitted or placed on medication at the RTC ($n = 149$, 1 missing). The most common category of diagnosis was disruptive behavior disorders (79%, $n = 117$), followed by ADHD (18%, $n = 27$), anxiety disorders, (17%, $n = 25$), other diagnoses (10%, $n = 14$), and mood disorders (9%, $n = 13$). Only one participant was identified as having a psychotic disorder. Due to problems with data collection,
the diagnostic information presented here is considered limited and an underrepresentation of
the total diagnoses present within the population.

Symptomology

Medication admission status. A series of MANOVAs were done comparing those
admitted on medication with those not admitted on medication across the four objective
symptom measures. The first MANOVA was used with the four scales (physical symptoms, harm
avoidance, social anxiety, separation/panic) of the MASC as the dependent variables. The results
of the MANOVA was not statistically significant (Wilk’s Λ = .93, F(4, 166) = 3.24, p = .014) at the
.01 level, but was significant at the .05 level. For the MMPI-A, initial examination of the
correlation matrices revealed several non-significant correlations amongst the 3 validity and 10
basic clinical scales. Those scales that had non-significant correlations with two or more scales
were removed from the analysis, leaving seven intercorrelated scales: hypochondriasis,
depression, psychopathic deviate, paranoia, psychasthenia, schizophrenia, and social
introversion. The results of the MANOVA was not statistically significant (Wilk’s Λ = .855, F(7,
104) = 2.505, p = .019) at the .01 level, but was significant at the .05 level. The remaining scales
were each examined separately using independent samples t-tests. Results from all six t-tests
were non-significant at the .01 level, although the K scale and the masculinity/femininity scale
were significant at the .05 level. For the TSCC, a MANOVA was conducted on the six scales of the
TSCC (anxiety, depression, anger, PTSD, dissociation, sexual concerns). Box’s test for
homogeneity of regression slopes was violated and therefore Pillai’s Trace was used instead of
Wilk’s Lambda. The results of the MANOVA was not statistically significant (Pillai’s Trace = .07,
F(6, 165) = 2.18, p = .047) at the .01 level, but was significant at the .05 level. For the CPRS-R, a
MANOVA was done on five scales (oppositional, emotional lability, Conners’ Global Index, DSM-IV
Inattentive, DSM-IV hyperactive-impulsive). The results of the MANOVA was not statistically
significant (Wilk’s $\Lambda = .91, F(5, 143) = 2.69, p = .02$) at the .01 level, but was significant at the .05 level.

Overall, none of the comparisons were significant at the more conservative alpha level, but each MANOVA would have been significant if the more traditional alpha (.05) was used. Examination of means across the various measures indicates that those admitted on medications endorsed higher levels of symptoms across the majority of scales.

**Medication status at RTC.** A second set of MANOVAs were conducted comparing admission scores on the four symptom measures between the three medication groups (no medication, discontinued, and true responder). The results of the MANOVA was significant for the MASC scales (Wilk’s $\Lambda = .88, F(8, 330) = 2.81, p < .01, \eta^2 = .06$), indicating that the three medication groups did significantly affect the combined DV of the four MASC scales; however, the effect size was small. Univariate ANOVA and Scheffé post hoc tests were conducted as follow up tests. ANOVA results indicated significant differences for the physical symptom and separation/panic scales. Additionally, both the harm avoidance and social anxiety scales were significant at the .05 level. Scheffé post hoc results indicate that the true responders group endorsed more physical symptoms and separation/panic anxiety than the other two groups. No differences were noted between the discontinued and no medication groups. Results of the MASC analysis are presented in Table 1.
Table 1
Comparison of Medication Groups at Admission on the Scales of the MASC

<table>
<thead>
<tr>
<th>MASC scales</th>
<th>No Medication</th>
<th>Discontinued Medication</th>
<th>True Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Physical Symptoms</td>
<td>48.27</td>
<td>11.16</td>
<td>52.73</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td>44.12</td>
<td>11.23</td>
<td>46.42</td>
</tr>
<tr>
<td>Social Anxiety</td>
<td>47.19</td>
<td>11.75</td>
<td>51.07</td>
</tr>
<tr>
<td>Separation/Panic</td>
<td>51.63</td>
<td>14.54</td>
<td>54.09</td>
</tr>
</tbody>
</table>

Note: MASC = Multidimensional Anxiety Scale for Children
*p < .05. **p < .01

For the MMPI-A, a MANOVA was again conducted on the same seven clinical scales, this time with the three medication groups as the independent variable. The results of the MANOVA was significant (Wilk’s Λ = .76, F(14, 206) = 2.19, p < .01, η² = .13), but the effect size was small. Univariate ANOVA and Scheffé post hoc tests were conducted as follow up tests. ANOVA results indicated significant findings for the medication groups on the hypochondriasis, depression, paranoia, and psychasthenia scales. The schizophrenia scale was right at the alpha level. It should be noted that Levene’s test for equality of variances was violated for the hypochondriasis and psychasthenia scales; however, the sample size is considered robust enough to allow for cautioned interpretation. Scheffé post hoc results revealed that for each significant scale, the true responders group endorsed significantly more symptoms than the no medication group; no other differences were significant. Individual one-way ANOVAs were done on the remaining six scales. Results from all six ANOVAS were non-significant at the .01 level. The masculinity/femininity scale was significant at the .05 level. Results from the MMPI-A analyses are presented in Table 2.
Table 2
Comparison of Medication Groups at Admission on the Scales of the MMPI-A

<table>
<thead>
<tr>
<th>MMPI-A Scales</th>
<th>No Medication</th>
<th>Discontinued Medication</th>
<th>True Responders</th>
<th>F</th>
<th>η²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Hypochondriasis</td>
<td>49.67</td>
<td>9.01</td>
<td>52.74</td>
<td>10.71</td>
<td>59.73</td>
<td>14.30</td>
</tr>
<tr>
<td>Depression</td>
<td>50.56</td>
<td>10.04</td>
<td>54.10</td>
<td>8.60</td>
<td>58.48</td>
<td>10.83</td>
</tr>
<tr>
<td>Psychopathic Deviate</td>
<td>59.72</td>
<td>11.56</td>
<td>60.38</td>
<td>11.32</td>
<td>60.22</td>
<td>14.59</td>
</tr>
<tr>
<td>Paranoia</td>
<td>52.62</td>
<td>9.74</td>
<td>55.72</td>
<td>10.76</td>
<td>63.17</td>
<td>13.57</td>
</tr>
<tr>
<td>Psychasthenia</td>
<td>46.92</td>
<td>11.95</td>
<td>54.36</td>
<td>14.69</td>
<td>58.83</td>
<td>11.65</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>49.59</td>
<td>11.59</td>
<td>54.14</td>
<td>12.66</td>
<td>59.74</td>
<td>13.70</td>
</tr>
<tr>
<td>Social Introversion</td>
<td>44.77</td>
<td>10.15</td>
<td>49.52</td>
<td>11.83</td>
<td>50.74</td>
<td>11.86</td>
</tr>
<tr>
<td>L Scale</td>
<td>53.74</td>
<td>11.36</td>
<td>54.20</td>
<td>10.91</td>
<td>52.00</td>
<td>12.37</td>
</tr>
<tr>
<td>F Scale</td>
<td>54.10</td>
<td>9.04</td>
<td>52.64</td>
<td>9.51</td>
<td>55.17</td>
<td>9.54</td>
</tr>
<tr>
<td>K Scale</td>
<td>52.87</td>
<td>11.23</td>
<td>49.04</td>
<td>12.50</td>
<td>47.00</td>
<td>11.56</td>
</tr>
<tr>
<td>Hysteria</td>
<td>50.44</td>
<td>9.54</td>
<td>51.56</td>
<td>9.11</td>
<td>54.22</td>
<td>10.84</td>
</tr>
<tr>
<td>Masculinity/Femininity</td>
<td>41.23</td>
<td>7.90</td>
<td>45.48</td>
<td>10.10</td>
<td>46.86</td>
<td>11.33</td>
</tr>
<tr>
<td>Hypomania</td>
<td>56.74</td>
<td>12.67</td>
<td>55.62</td>
<td>10.60</td>
<td>58.52</td>
<td>15.58</td>
</tr>
</tbody>
</table>

Note: MMPI-A = Minnesota Multiphasic Personality Inventory- Adolescent Version

* Scales included in MANOVA analysis. ** Scales analyzed separately by one-way ANOVAs
*p < .05. **p < .01

The six scales of the TSCC were used in the next MANOVA. Box’s test for homogeneity of regression slopes was violated and therefore Pillai’s Trace was used in place of Wilk’s Lambda.

The results of the MANOVA was not statistically significant (Pillai’s Trace = .11, F(12, 330) = 1.63, p = .08). The five scales of the CPRS-R were included in the final MANOVA and the result was not statistically significant (Wilk’s Λ = .88, F(10, 284) = 1.93, p = .04) at the .01 level, but was significant at the .05 level.

Overall, significant differences were found between the true responder group and the other two groups on the physical symptoms and separation/panic scales of the MASC and between the true responder group and the no medication group on the hypochondriasis,
depression, paranoia, and psychasthenia scales of the MMPI-A. The schizophrenia and masculinity/femininity scales would have been significant at the .05 level.

In Treatment

Medication discontinuation period

A total of 34 participants had a baseline BPRS-E total score available. The overall mean was 38.00 (SD = 11.99). For the true responder group the mean was 42.45 (SD = 15.25) and for the discontinued group the mean was 35.87 (SD = 9.76). An independent samples t-test was conducted and the difference in mean scores between the two groups was not statistically significant (t(32) = -1.53, p = .14). A total of 26 participants had at least one additional BPRS score available beyond the initial baseline score. The last score available for each of the 26 participants was used as the final BPRS-E score. The overall mean was 31.00 (SD = 8.25). For the true responder group the mean was 32.00 (SD = 7.33) and the discontinued group was 30.63 (SD = 8.73). A repeated measures MANOVA was done with the baseline and last BPRS-E scores as the within-groups measure; medication status (true responder/ discontinued) was used as a between-groups measure. The within-groups comparison was significant (Wilk's Λ = .73, F(1, 24) = 8.93, p < .01, η² = .27), indicating that the last BPRS-E score was significantly different from the baseline score. The average change from baseline to last BPRS-E score was a 7.12 reduction. Only 4 of the 26 participants had an increase in BPRS-E scores from baselines to last. The between-subjects comparison was not statistically significant (Wilk's Λ = .99, F(1, 24) = .02, p = .90), indicating that there was not a statistically significant difference between the medication groups in change on BPRS-E scores from baseline to last.

An ANCOVA was conducted using medication classes (antipsychotics, stimulants, antidepressants, anticonvulsants, antihypertensives) as independent variables. Each variable was coded dichotomously (yes/no). The last BPRS-E score was used as the dependant variable.
and the baseline score as the covariate. None of the medication classes were significant, nor were any interaction effects, suggesting that no differences were present in last BPRS-E scores based on medication classes, while controlling for baseline BPRS-E scores.

These results suggest that participants experienced a decrease in symptoms over the medication reduction observation period. No differences were present between the discontinued and true responders group or between medication classes. It should be noted that the sample size for these analyses were small, which limited the statistical power to detect differences.

Program performance

Pre-analysis of the Program Compliance Index score revealed extreme positive skewness. As such, a logarithm transformation was used. The transformed data was re-analyzed and the assumption of normality was met. Means and standard deviations are reported in the original scale. A one-way ANOVA was conducted comparing the three medication groups on average PCI score. The ANOVA was significant \( F(2, 193) = 28.70, p < .01, \eta^2 = .23 \), but the effect size was small. Scheffé post hoc results revealed that the no medication group \( (M = 290.25, SD = 303.93) \) had significantly higher program compliance scores than the discontinued \( (M = 111.11, SD = 155.77) \) and true responder \( (M = 59.93, SD = 55.13) \) groups. No statistically significant difference was present between the discontinued and true responder groups. However, based on the RTC categorical levels the discontinued group would be considered outstanding and the true responder group successful.

A one-way ANOVA was conducted comparing the three medication groups on LCI scores. The ANOVA was significant \( F(2, 193) = 29.88, p < .01, \eta^2 = .24 \), but the effect size was small. Scheffé post hoc results revealed that the no medication group \( (M = 1.38, SD = .85) \) had significantly lower LCI scores than the discontinued \( (M = 2.10, SD = .82) \) and true responder \( (M = \)
2.56, SD = .71) groups, suggesting that during treatment the no medication group had fewer large scale behavioral problem incidents than the other two groups. No statistically significant differences were found between the discontinued and true responder groups.

Discharge

Discharge status

Of the 190 participants with discharge status data available, 146 (77%) had a planned discharge from the RTC. Chi-square analysis was conducted on discharge status and the three medication groups and found no significant relationship (χ² = 2, 190 = 1.26, p = .53).

Time in treatment

The average length of stay in the RTC was 1.63 years (SD = .78, n = 215). A one-way ANOVA was conducted comparing the three medication groups on length of treatment. The ANOVA was not statistically significant (F(2, 212) = 2.78, p = .07), indicating that there was no difference between the groups on time spent at the RTC.

Medication

Of the 145 participants admitted on medication, 49 (34%) were put back on medication by discharge. Additionally, 5 participants not admitted on medications were prescribed medication by discharge, for a total of 54 participants discharged on medication (i.e., true responders). Therefore, of the total sample (N = 226) 24% were discharged on medication, compared to 64% at admission. This constitutes a nearly 63% reduction in number of participants on medication. Chi-square analyses were conducted on the overall medication rates at admission and discharge and for each medication class. Each of the analyses was significant, indicating a statistically significant reduction in the overall number of people taking medications and for each separate medication class. Table 3 lists the results of the analyses.
Table 3

*Number of Adolescents on Medication at Admission and Discharge*

<table>
<thead>
<tr>
<th>Medication</th>
<th>Admission</th>
<th>Discharge</th>
<th>$\chi^2$</th>
<th>$\phi$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antidepressants</td>
<td>96</td>
<td>22</td>
<td>7.073</td>
<td>.221</td>
<td>.008</td>
</tr>
<tr>
<td>Stimulants</td>
<td>92</td>
<td>26</td>
<td>18.251</td>
<td>.355</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Antipsychotics</td>
<td>64</td>
<td>15</td>
<td>8.727</td>
<td>.245</td>
<td>.003</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>36</td>
<td>5</td>
<td>15.680</td>
<td>.329</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Antihypertensives</td>
<td>35</td>
<td>9</td>
<td>15.077</td>
<td>.322</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Medication overall</td>
<td>145</td>
<td>54</td>
<td>21.804</td>
<td>.311</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

For those discharged on medication 33 (61%) had one medication, 10 (19%) had two, and 7 (13%) had three. Two participants were discharged on four medications, one participant was discharged on five, and a final participant was discharged on six. Of the four participants discharged with four or more medications two had reductions compared to admission, one remained the same, and the final participant had one medication added. At discharge, only 20% had three or medications, compared to 45% at admission. For those discharged on medication, the average number of medications was 1.72 ($SD = 1.14$), down from 2.48 at admission.

For those admitted and discharged on medication, 36 (74%) had a decrease in number of medications, 11 (22%) experienced no change, and only one participant had an increase. Overall, these participants had an average decrease of 1.47 medications ($SD = 1.55$). Of the five participants who started medications at the RTC, four of them were prescribed one medication (a stimulant) and the fifth was prescribed two. At discharge, stimulants were the most commonly prescribed medication, followed in order by antidepressants, antipsychotics, antihypertensives, and anticonvulsants. No individuals were discharged on a Benzodiazepine.

An independent samples t-test was done to compare the number of medications at admission between the discontinued and true responder group (minus the five participants who
started medication at the RTC). Levene’s test for equality of variances was violated; therefore the t-test results were interpreted for unequal variances. The t-test was statistically significant \((t(74.42) = -4.67, p < .01)\), indicating that the true responders group \((M = 3.24, SD = 1.55)\) were admitted on more medications than the discontinued group \((M = 2.08, SD = 1.55)\).

**Symptomology**

A MANCOVA was planned to analyze the scales of the MASC. However, due to violations of the homogeneity of regression slopes assumption for three of the four MASC scales, each scale was analyzed separately using ANCOVAs. Homogeneity of regression slopes was analyzed again for each separate ANCOVA and the assumption was met for each. ANCOVA results for each scale were not statistically significant: physical symptoms scale \((F(2, 85) = .82, p = .45)\), harm avoidance scale \((F(2, 85) = .36, p = .70)\), social anxiety scale \((F(2, 85) = .19, p = .83)\), and separation/panic scale \((F(2, 85) = .17, p = .85)\).

For the MMPI-A, initial evaluation of the correlation matrices revealed only six intercorrelated scales that met the assumption of linearity for a MANCOVA: hypochondriasis, psychopathic deviate, paranoia, psychasthenia, schizophrenia, and hypomania. Evaluation of the homogeneity of regression slopes indicated that an interaction effect was present for both the psychasthenia and schizophrenia scales. Therefore, the remaining four scales (hypochondriasis, psychopathic deviate, paranoia, and hypomania) were included in the MANCOVA analyses, with the corresponding admission scores were used as covariates. The MANCOVA was not statistically significant \((\text{Wilk’s } \Lambda = .73, F(8, 98) = 2.07, p = .046)\) at the .01 level, but was at the .05 level. Next, four scales (L, F, and K validity scales and schizophrenia) were evaluated independently using ANCOVA analyses with the corresponding admission score as the covariate. Each of the ANCOVAs were not statistically significant: L scale \((F(2, 53) = .01, p = .99)\), F scale
For the remaining MMPI-A scales, a significant interaction effect was observed between medication groups and admission scores on the discharge scores, preventing the use of ANCOVAs. Additionally, an inadequate cell size for the true responders group prevented analyses of simple main effects at different levels of the covariate. Therefore, admission scores were not used as covariates. The depression, hysteria, and social introversion scales were intercorrelated and met the other assumptions for MANOVA analysis. The MANOVA was not statistically significant (Wilk's $\Lambda = .91$, $F(6, 168) = 1.29$, $p = .27$). Separate one-way ANOVAs were used for the remaining two scales and neither were significant: masculinity/femininity ($F(2, 86) = .49$, $p = .61$) and psychasthenia ($F(2, 86) = .18$, $p = .84$).

Pre-analysis for the TSCC scales indicated that the admission sexual concerns scale had a significant interaction effect with medication groups on the combined dependant variable and was therefore omitted from the MANCOVA. Evaluation of homogeneity of regression slopes was re-evaluated with the remaining five scales and the assumption was met. The admission scores for the five scales were used as covariates. The MANCOVA was not statistically significant (Wilk's $\Lambda = .88$, $F(10, 158) = 1.04$, $p = .41$). A separate ANCOVA was conducted on the sexual concerns scale of the TSCC, with the corresponding admission score used as the covariate. The results of the ANCOVA was not statistically significant ($F(2, 87) = 3.20$, $p = .046$) at the .01 level, but was at the .05 level.

For the scales of the CPRS-R, pre-analysis for a MANCOVA revealed a significant interaction effect between the admission DSM-IV inattention scale and medication group on the combined dependant variable. Therefore, this variable was excluded from the MANCOVA. The remaining four scales were re-evaluated and the assumption of homogeneity of regression
slopes was met. The results of the MANCOVA was not statistically significant (Wilk's $\Lambda = .83$, $F(8, 136) = 1.71, p = .10$). A separate ANCOVA was conducted on the DSM-IV inattention scale, with the admission score as the covariate. The assumption of homogeneity of regression slopes was analyzed and met. The results of the ANCOVA was not statistically significant ($F(2, 74) = .18, p = .84$).

Overall, none of the comparisons revealed statistically significant differences between the medication groups at the more conservative alpha level set for this study. Unlike the admission symptomology analyses, only a few analyses would have been significant at the traditional alpha level. This suggests that for these measures of symptomology little, if any, differences existed between the three groups at discharge from the RTC.

Follow Up

Follow up data was gathered at 3, 6, and 12 months post discharge. The response rate averaged 74%, 54%, and 37% respectively. The frequencies for each follow up period are presented in Table 4.

Medication use

At the 3 month follow up, 27% of participants with available data were taking psychotropic medications. Nearly 77% of the true responders group was still taking medication, 17% of the discontinued medication group resumed taking medications, and 9% of the no medication group began taking medication. At 6 months, overall 25% were taking psychotropic medications, 50% of the true responder group, 22% of the discontinued group, and 9% of the no medication group. At 12 months, the overall number was 22%, with 55% of the true responder group, 12% of the discontinued group, and 5% of the no medication group taking medication.
Criminal arrests/charges

Participants were asked about any new arrests or charges since the last observation period. A total of 18% acknowledged being arrested or charged between discharge and 3 months, 19% between 3 and 6 months, and 35% between 6 and 12 months. It should be noted that there were some concerns regarding possible respondent confusion over the wording of these items, possibly inflating the number of reported arrests. However, it can be concluded that 35% of respondents were arrested or changed at least once during the first year post-discharge. There was no significant relationship between the three medication groups and arrests or charges at 3 months ($\chi^2(2, 172) = 1.56, p = .56$), 6 months ($\chi^2(2, 122) = 2.06, p = .36$), or 12 months ($\chi^2(2, 78) = 3.38, p = .19$) post discharge.

Living environment

Living environment post-discharge was broken down into three categories: reintegrated (living with parent(s), other family member, or independently), improved (living in less restrictive structured setting such as therapeutic foster home or independent living program), or unsuccessful (living in a more restrictive setting such as a juvenile correctional facility, refusing appropriate placement, or ran away). Across observation periods two-thirds to three-fourths of participants were able to remain at a less restrictive environment. There was no significant relationship between the three medication groups and living environment status at 3 months ($\chi^2(4, 179) = 6.09, p = .19$), 6 months ($\chi^2(4, 133) = 3.85, p = .43$), or 12 months $\chi^2(4, 92) = 2.59, p = .63$) post discharge.
Table 4

Total Responses for 3, 6, and 12 Month Follow Up Periods.

<table>
<thead>
<tr>
<th>Follow up Item</th>
<th>3 months</th>
<th>6 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking Medication</td>
<td>42 (27%)</td>
<td>30 (25%)</td>
<td>16 (22%)</td>
</tr>
<tr>
<td>Total n</td>
<td>162</td>
<td>118</td>
<td>73</td>
</tr>
<tr>
<td>Arrested or Charged</td>
<td>31 (18%)</td>
<td>23 (19%)</td>
<td>27 (35%)</td>
</tr>
<tr>
<td>Total n</td>
<td>172</td>
<td>122</td>
<td>78</td>
</tr>
<tr>
<td>Living Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>reintegrated(^a)</td>
<td>84 (47%)</td>
<td>62 (47%)</td>
<td>45 (49%)</td>
</tr>
<tr>
<td>improved(^b)</td>
<td>40 (22%)</td>
<td>40 (30%)</td>
<td>22 (24%)</td>
</tr>
<tr>
<td>unsuccessful(^c)</td>
<td>55 (31%)</td>
<td>31 (23%)</td>
<td>25 (27%)</td>
</tr>
<tr>
<td>Total n</td>
<td>179</td>
<td>133</td>
<td>92</td>
</tr>
<tr>
<td>School status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular Ed(^d)</td>
<td>61 (34%)</td>
<td>47 (35%)</td>
<td>27 (28%)</td>
</tr>
<tr>
<td>Special Ed(^e)</td>
<td>81 (46%)</td>
<td>52 (39%)</td>
<td>38 (40%)</td>
</tr>
<tr>
<td>Not attending(^f)</td>
<td>35 (20%)</td>
<td>34 (26%)</td>
<td>31 (32%)</td>
</tr>
<tr>
<td>Total n</td>
<td>177</td>
<td>133</td>
<td>96</td>
</tr>
<tr>
<td>Grades</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average or above</td>
<td>95 (65%)</td>
<td>65 (59%)</td>
<td>38 (49%)</td>
</tr>
<tr>
<td>Below average/failing</td>
<td>52 (35%)</td>
<td>45 (41%)</td>
<td>40 (51%)</td>
</tr>
<tr>
<td>Total n</td>
<td>147</td>
<td>110</td>
<td>78</td>
</tr>
</tbody>
</table>

\(^a\)Reintegrated = living with parent(s), other family, or independently. \(^b\)Improved = less restrictive living environment (e.g., therapeutic foster home). \(^c\)Unsuccessful = more restrictive living environment (e.g., juvenile correctional facility). \(^d\)Regular ed = attending or graduated from regular education or GED program. \(^e\)Special ed = attending or graduated from special or alternative education program. \(^f\)Not attending = dropped out or repeated suspensions and expulsions.

Academic status

Participants were asked if they were attending or had graduated from either regular or special education. Across observation periods over two-thirds of participants were attending or had graduated from regular, alternative, or special education, although the percentage decreased at each observation period from 80% to 68%. There was a significant relationship between medication group and academic status at 3 months post discharge ($\chi^2(4, 177) = 24.56,$
φ = 37, p < .01). There was no significant relationship at 6 months ($\chi^2(4, 133) = 5.82, p = .21$). At 12 months, the results of the chi-square was exactly at the significant level ($\chi^2(4, 96) = 13.89, \phi = .37, p = .01$). At all follow up periods, over half of those in the True Responder group were in special education classes. The frequencies for the 3 and 12 month follow up periods are presented in table 5.

Table 5

<table>
<thead>
<tr>
<th>Medication Status</th>
<th>Regular Education$^a$</th>
<th>Special Education$^b$</th>
<th>Not Regularly Attending$^c$</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 month follow up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No medication %</td>
<td>39.1</td>
<td>28.1</td>
<td>32.8</td>
<td>100</td>
</tr>
<tr>
<td>(n = 64)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discontinued %</td>
<td>39.2</td>
<td>45.9</td>
<td>14.9</td>
<td>100</td>
</tr>
<tr>
<td>(n = 74)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>True responders %</td>
<td>17.9</td>
<td>74.4</td>
<td>7.7</td>
<td>100</td>
</tr>
<tr>
<td>(n = 39)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total %</td>
<td>34.5</td>
<td>45.8</td>
<td>19.8</td>
<td>100</td>
</tr>
<tr>
<td>(n = 177)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 month follow up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No medication %</td>
<td>52.0</td>
<td>16.0</td>
<td>32.0</td>
<td>100</td>
</tr>
<tr>
<td>(n = 25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discontinued %</td>
<td>23.4</td>
<td>42.6</td>
<td>34.0</td>
<td>100</td>
</tr>
<tr>
<td>(n = 47)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>True responders %</td>
<td>12.5</td>
<td>58.3</td>
<td>29.2</td>
<td>100</td>
</tr>
<tr>
<td>(n = 24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total %</td>
<td>28.1</td>
<td>39.6</td>
<td>32.3</td>
<td>100</td>
</tr>
<tr>
<td>(n = 96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a$Attended or completed regular education. $^b$Attended or completed special or alternative education. $^c$Dropped out or repeated suspensions and expulsions.

School grades

Participants were asked what grades they were, or had been, earning. At 3 months, 68% reported earning average or above grades. That number dropped to 49% by 12 months. There was no significant relationship between medication status and school grades at 3 months ($\chi^2(2,$
147) = 3.44, p = .18), 6 months (χ²(2, 110) = 2.70, p = .26), or 12 months (χ²(2, 78) = .65, p = .72)
post discharge.

**Combined outcomes**

In examining each follow up variable separately, the results suggest that around 60% or more of participants maintained desirable outcomes throughout the follow up periods, with the exception of grades at 12 months post discharge. However, when the follow up variables are examined in combination, the results were somewhat less encouraging. At 3 months, 54% had no criminal charges or arrests, a less restrictive living environment, were regularly attending or had completed school, and were earning average or above grades. At 6 months, that number dropped to 46% and at 12 months to 31%.
DISCUSSION

General Findings

The purpose of the present study was to evaluate the effectiveness of an RTC for adolescent males that utilizes a medication reduction protocol. At admission, 64% of participants were taking at least one psychotropic medication with over 69% of those taking two or more, with an average number of medications at 2.48. The rate of concomitant medication use and average number of medications in this sample was higher than the 40% concomitant rate and 1.9 average found in the Connor et al. (1998) study. This finding is particularly concerning given the lack of research on concomitant medication use, especially considering that 20% of those admitted on medication in the current study were taking four or more different medications. The overall prevalence of medication use at admission was similar to those reported in other RTC studies (Bellonci & Henwood, 2006; Breland-Noble et al., 2004; Connor et al., 1998; Najjar et al., 2004; Warner et al., 2004). It is also worth noting that the True Responder group was taking more medications at admission.

As with the Handwerk et al. (2008) study, those admitted on medication tended to have higher levels of presenting symptomology, although in the present study these differences were not significant at the .01 level. When the three medication status groups (no medication, discontinued, true responder) were compared on admission scores the true responder group had higher levels of symptomology than the other two groups across most measures. There was a statistically significant difference between the true responder and other two groups on the physical symptoms and separation/panic scales of the MASC. The physical symptoms scale is
particularly noteworthy, as medication side-effects may have contributed to the increased scores for the True Responder group. Additionally, the true responder group had statistically significantly higher scores than the no medication group on the hypochondriasis, depression, paranoia, and psychasthenia scales of the MMPI-A. Furthermore, several other comparisons would have been significant at the .05 level. These results suggest that, consistent with other reports, those admitted on medication and, especially those who remained on medication, tended to endorse higher levels of symptomology at admission. Although the effect sizes for these differences were generally small, the observed differences generally ranged from 7 to 12 points higher for the True Responder group, a difference that could very well have clinical significance. This finding suggests that those who remained off of medication and those placed back on medication were already exhibiting differences before treatment began.

During the medication reduction period BPRS-E scores at baseline, just prior to the medication discontinuation period, were significantly higher than the scores at the last evaluation period. This suggests a somewhat paradoxical finding: as participants were taken off of their medication, their reported and observed symptoms decreased. The sample size for this particular analysis was notably small, thus making it difficult to draw meaningful conclusions about this result. Furthermore, the measure used to monitor stimulant medication, the most frequent medication type at discharge, was not used in the present study. Complicating interpretation even more is that the participants were receiving therapeutic intervention at the RTC during this time, which may partially explain the decrease in symptoms. Nonetheless, this finding raises questions about the actual impact of these medications. There were no statistically significant differences on BPRS-E scores between those placed back on medication and those who were not. This is somewhat surprising as the RTC reportedly uses BPRS-E scores to aid in determining which participants truly benefit from medication. It may suggest that other
factors more heavily contributed to the decision whether to place an adolescent back on medication.

After the medication discontinuation observation period 66% of those admitted on medication remained off of medication through discharge. Overall, 24% of the participants were discharged on medication, which is similar to the 26% reported by Handwerk et al (2008). For those discharged on medication 74% had the number of medications reduced. Furthermore, although not reported in the present study, it is likely that those remaining on medication also had dosages lowered.

Similar to the Handwerk et al. (2008) study, those not taking medication had better in-treatment success. In the present study those never on medication at the RTC had better program compliance and fewer large scale behavioral problems. This may be partially due to the fact that the measures used to assess in-treatment success were an average score for the participants’ entire length of stay. The use of mean scores for these indicators did not allow for assessment of change over time. Considering the findings of symptomology scores at admission and discharge, it is possible that the differences in mean scores were the result of the Discontinued group and True Responder group having poorer RTC performance at the beginning of treatment. No differences were observed between the medication groups on treatment duration or planned discharges. No statistically significant differences were noted on any of the discharge symptomology measures. Further, only two analyses, a MANCOVA with select MMPI-A scales and an ANCOVA with the sexual concerns subscale of the TSCC, would have been significant at the .05 level. These findings suggest that any differences in symptomology that may have been present at admission were no longer present by discharge. These results indicate that the RTC program equalized symptomology for all residents, regardless of medication status. In addition to general RTC treatment effectiveness, another possible
explanation for the symptom equalization is that almost all of those admitted on medication had their medications reduced or discontinued and, as was seen in the BRPS-E findings, the reduction of medication may have some relationship to symptomology. It is also possible that medication side-effects were contributing to elevated symptoms at admission. These findings are different from the Handwerk et al. study which found that being discharged on medication was associated with more treatment failure, including shorter treatment durations and higher levels of behavioral and emotional problems at discharge. This disparity may be due to differences in sample characteristics. In the Handwerk et al. study 40% of participants were admitted on medication, with 18% of those on multiple medications, compared to 64% and 69%, respectively, in the current study. Another possible explanation is that the RTC in the current study may have been more effective at discontinuing medication, thus reducing any iatrogenic medication effects. In the Handwerk et al. study over half of participants admitted on medication remained on medication at discharge, compared to only 34% in the current study. The differences between the two studies may also be the result of medication protocol, in that clients placed back on medication at the RTC in the current study were observed and closely monitored for an extended period of time. This observation period provided the prescribing psychiatrist with specific and detailed information on observed symptoms, allowing for more targeted medication use. Whatever the explanation, it appears that the RTC in the present study, with its use of the medication reduction protocol, was more successful at treating those who remained on medication.

At all follow up periods, the overall rate of medication use ranged from 22% to 27%, similar to the 24% at discharge. For those discharged on medication 75% continued taking medication at 3 months, but this number dropped to 50% and 55% for 6 and 12 months respectively. The rates of medication use were between 12% and 22% across follow up periods
for those that had their medications discontinued at the RTC. The follow up rates of medication use remained low (5% to 9%) for those never on medication at the RTC.

For other follow up measures, no differences were observed between the groups on arrests or criminal charges. Although there was some concern regarding measurement error for this variable, it can be determined that, overall, 35% were arrested or charged within a year of discharge. No differences between the groups were present for post-discharge living environment either, which is different from the Handwerk et al. (2008) study that found those discharged on medications had more formal placements and were more likely to be living in a treatment facility. In the present study around 70% of participants were living with parents, family, independently, or in a less restrictive structured environment (e.g., therapeutic foster home) at each follow up period; the remaining participants had either ran away, were refusing placement, or were living in a more restrictive setting (e.g., juvenile correctional facility). The 70% found in this study is particularly encouraging considering that McMillen et al. (2008) found that over half of RTC clients end up being readmitted to an equal or higher level of care placement within a year.

The only follow-up category to have group differences was academic status. The primary difference appeared to be that there were far more True Responders in special education across all observation periods. Coupled with the finding that stimulant medication was the most commonly prescribed medication at discharge, this finding may provide some descriptive information about the True Responder group and the nature of their symptoms. Specifically, it may suggest that those in the True Responder group were more likely to have organic symptoms related to problems with sustained attention and focus. Additionally, at 3 months post-discharge more participants from the No Medication group were not regularly attending school; however, this difference was not present at either 6 or 12 months, due to an increase in non-
attendance for the Discontinued and True Responder groups. Overall, 80% of participants were either attending or had completed regular or special education at 3 months; this fell to 68% at 12 months. No differences were observed between the groups on grades earned. Overall, at 3 months 65% of participants were earning grades of average or better, but that number was down to 49% at 12 months.

The overall treatment effectiveness of the RTC was generally encouraging. At discharge, over three-fourths of participants successfully completed treatment and demonstrated reductions in symptomology across multiple measures. The results from the current study at discharge were generally more favorable than many previously published studies (e.g., Burks, 1995; Lewis et al., 1980; Lyons et al., 2001; Rhode et al., 2004). At the follow up periods over two-thirds of adolescents maintained positive outcomes on most individual follow up indicators. However, the number of adolescents maintaining desirable outcomes across all indicators fell below one-third at 12 months. The follow up results were similar to other studies in that the positive gains made in treatment tended to diminish somewhat over time (e.g., McMillen et al., 2008; Palmer, 1974; Weinstein, 1974). This finding emphasizes the need for future research to utilize follow up periods of up to at least one year, considering that in the current study many of the diminished gains were only present at 12 months.

Overall, the treatment effectiveness of the RTC was generally similar to or better than other published reports. Almost no differences were observed between those not on medication, discontinued from medication, or continued on medication on outcome variables at discharge or follow up, suggesting that the RTC effectiveness was equal for all three groups. This also suggests that the RTC was successful at correctly identifying those who truly responded to medications from those who did not. The hypotheses that the three groups would fare equally
were generally confirmed, except for the No Medication group having higher mean scores on in-treatment indicators of program performance.

The most salient findings from this study are that nearly two-thirds of those admitted on medication were able to be successfully discontinued from their medication without any notable adverse effects and fared just as well as those never on medication in the first place. The majority of those placed back on medication had a decrease in number of medications and also fared just as well as those not taking medication. Secondly, the observed relationship between medication discontinuation and decreased symptoms was surprising. There was not enough data in the current study to make meaningful conclusions about this finding, but it warrants further evaluation.

Limitations

The primary limitation of this study is that it is based on archival data from one residential treatment center. This, in combination with the use of longitudinal data led to a large amount of missing agency data. The use of archival data also prevented the use of other assessment measures that may be better suited to measure the variables of interest. For example, including assessment measures specifically designed for medication side-effects, such as the Simpson-Angus Rating Scale (SARS; Simpson & Angus, 1970) or the Abnormal Involuntary Movement Scale (AIMS; Guy, 1976), may have provided a more full account of the impact of medication use and discontinuation. Also, the absence of the measure used for stimulant medication limited the findings related to the medication discontinuation period. Additionally, although the overall sample size was adequate for most analyses, the amount of missing data for a few comparisons created notably small sample sizes. For example, the lack of diagnostic information prevented further evaluation of the relationship between medications, symptoms, and diagnosis. The data
that was used was combined from multiple sources within the RTC. Although every effort was made to ensure continuity and compatibility of the multiple data sources, possible unknown error variables may have diminished the interpretability and generalizability of the results. The RTC was only for male adolescents, obviously further limiting the generalizability. The use of a more conservative alpha level for this study was appropriate due to the number of analyses being conducted. However, this limited the ability to detect differences when they appeared to exist, thereby inflating type II error.

Suggestions for Future Research

Primarily, it is suggested that future research be done on a planned, *a priori* evaluation of a reduction protocol as opposed to archival data to minimize missing data, ensure that proper measures be used for this specific purpose and to allow for a more systematic implementation of the protocol. Further, it would be beneficial for future research be done on all sexes. It is advised to use a comparison group RTC to better evaluate medication utilization and treatment outcomes. Follow up periods of at least one year should also be used. The potential iatrogenic impact of medication use warrants further exploration to better understand the relationship between medication use and symptomology, as well as studies on the impact of medication discontinuation in general. Ideally, this type of research would focus on the relationship between medication and potential side-effects, symptoms, and diagnosis. Lastly, the use of random assignment between discontinued and continued medication groups may be considered if it can be conducted in an ethically appropriate manner.

Conclusions

Despite its limitations, this study demonstrates that the RTC medication protocol was highly successful at reducing the number of participants on medication and reducing the number of medications for those who continued taking them. Additionally, at discharge and at
follow up periods the participants in the current study generally reached and maintained many of their treatment objectives, regardless of medication status. This suggests, at a minimum, that the medication reductions and discontinuations did not negatively impact client outcomes, and perhaps even helped improve them. The clients at this RTC reached desirable outcomes comparable or better than other studied RTC clients, who presumably are continuing to be discharged on high rates of medication. There generally appears to be fear among parents and treatment providers when it comes to discontinuing medication and far too often providers are all too willing to try pharmaceutical intervention, especially with this population. The results of this study suggest that RTC treatment can be effective without relying on the common practice of alarmingly high medication utilization.

There is no question that the RTC population is especially challenging to treat and is often treatment resistant. Furthermore, there are certainly some adolescents that truly benefit from psychotropic medication. However, it is imperative that psychiatric providers demonstrate patience and prudence in prescribing and evaluating medication use so that the true benefits can be realized while potential adverse effects are minimized. The common practice of prescribing excessive medication to this population appears ineffective and potentially dangerous. After all, this type of medication use did not prevent these adolescents from requiring residential level-of-care in the first place. A residential setting provides an ideal environment to allow for the safe use of a medication reduction protocol where clients can be continually observed and monitored over an adequate period of time. These findings lend support for other RTCs to utilize some form of discontinuation observation period to better determine which adolescents are actually benefiting from medication.
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