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Effects of Multidimensional Family Therapy (MDFT) on Nonopioid Drug Abuse: A Systematic Review and Meta-Analysis

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Abstract

Purpose: This review evaluates the evidence of the effects of multidimensional family therapy (MDFT) on drug use reduction in young people for the treatment of nonopioid drug use. **Method:** We followed Campbell Collaboration guidelines to conduct a systematic review of randomized and nonrandomized trials. Meta-analytic methods were used to quantitatively synthesize study results. **Results:** The search yielded five studies that met inclusion criteria. MDFT was found to be more effective than other treatments on drug abuse problem severity and drug use frequency in the short run but not in the long run and demonstrated positive effects on treatment retention compared to control conditions. **Discussion:** While additional research is needed, the review offers support for MDFT as a treatment to young nonopioid drug abusers. The number of studies included in this review was limited, however, and this should be considered when interpreting the results.

Keywords

abuse, systematic review, quantitative, meta-analysis

Youth drug abuse, the consumption of drugs beyond experimentation and into addiction of the kind that persists beyond the experimentation phase, is a severe problem worldwide (United Nations Office on Drugs and Crime, 2010). Abuse of drugs such as cannabis, amphetamine, and cocaine, referred to in this review as nonopioids, are strongly associated with a broad range of negative health implications such as traffic accidents; sexually transmitted diseases; mental problems and suicide; as well as social problems including poor academic achievement, delinquency, and violent behavior (Deas & Thomas, 2001; Essau, 2006; Lynskey & Hall, 2000; Nordstrom & Levin, 2007; Office of National Drug Control Policy, 2000; Rowe & Liddle, 2006; Shelton, Taylor, Bonner, & van den Bree, 2009).

While cannabis, amphetamine, cocaine, and other nonopioid drugs remain illegal in most countries, surveys indicate widespread prevalence. In the United States, 25.5% of 12th-grade students report having used an illicit drug within the last month (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2014). In Canada, 21% of 15- to 24-year-olds report having used of some kind of illicit drug within the last year (Health Canada, 2011). In Australia, 7% of 12- to 17-year-olds report using some kind of drug within the last month (White & Smith, 2009). The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 2010) has found that prevalence within Europe differs significantly from country to country but that overall around a quarter of Europeans report having used some kind of illicit drug in their lifetime.

The prevalence of specific kinds of illicit drug abuse varies significantly, with cannabis generally being the most commonly used drug. In the United States, 22.7% of 12th-grade students report having used marijuana/hashish (types of cannabis), 4.1% used amphetamine, and 1.1% used cocaine during the last 30 days before the National Survey on Drug Use was conducted in 2013 (Johnston et al., 2014). The European Drug Report of 2013 indicates that 11.7% of the 15- to 34-year-olds in Europe has used cannabis, 1.3% used amphetamine, and 1.9% used cocaine during the last year (EMCDDA, 2010).

Although not all drug users' progress to severe drug abuse and dependence, some do and therefore warrant treatment. Individuals who warrant drug treatment are described variously as abusers, misusers, or dependent. These specific categorizations are used in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*; American Psychiatric Association [APA], 1994, 2000, 2013). While the DSM is widely used, the I*nternational Statistical Classification of Diseases* and Related Health problems (*ICD*, now *ICD*-10) developed by the World Health Organization (WHO) is also in wide use. Differences between these rubrics concern both terminology and categorization

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criteria. For example, *DSM*-V (APA, 2013) includes the category ''abuse,'' while *ICD*-10 explicitly avoids this term on the grounds of its ambiguity; harmful use and hazardous use are the equivalent terms in WHO usage, but the categories are not identical; and while *ICD*-10 uses only physical and mental criteria, the *DSM* also includes social criteria (Nordegren, 2002; WHO, 2011).

Research draws attention to the significant gap between the number of young people classified as in need of treatment and the number of young people who actually receive such treatment (National Survey on Drug Use and Health, 2007; Substance Abuse and Mental Health Services Administration [SAMHSA], 2010). In the United States, for example, 7.2 million young people are classified as needing treatment for illicit drug abuse, but only 1.4 million of these actually receive treatment at a specialty facility for an illicit drug abuse problem (SAMHSA, 2011). When young people do receive treatment, it is most often delivered in outpatient settings. Approximately 90% of the 89,521 clients under age 18 registered in substance abuse treatment in 2012 by SAMHSA were in outpatient treatment (SAMHSA, 2013). Equal proportions of the clients under age 18 were enrolled in facilities with a primary focus on substance abuse treatment and in facilities with a mix of mental health and substance abuse treatment services (SAMHSA, 2013). Cognitive–behavioral therapy (CBT) and motivational interviewing are specific therapeutic approaches that are used to some extent by most (91% and 87%, respectively) treatment facilities (SAMHSA, 2013).

There is growing public concern about the effectiveness and high cost of available treatments for young people and the high rates of treatment dropout and posttreatment relapse to drug abuse (Austin, Macgowan, & Wagner, 2005; Najavits & Weiss, 1994; Stanton & Shadish, 1997). While relapse must be acknowledged as an expected part of any treatment process targeting individual drug abuse, efforts should be made to make treatment as attractive, accessible, and relevant as possible for young people in order to minimize the risk of unwarranted dropout and continuous relapse (National Institute on Drug Abuse [NIDA], 2009; Simmons et al., 2008). Furthermore, the services provided should be empirically supported to increase the likelihood that (a) treatment will be successful and (b) public spending supports the interventions that are most effective.

Young people who abuse drugs persistently and to an extent that warrants treatment have unique needs due to their particular cognitive and psychosocial developmental stage. Recognizing that young people are particularly sensitive to social influences, families and peer groups being highly influential, authorities such as the U.S. NIDA recommend that youth drug treatments facilitate positive parental and peer involvement (NIDA, 2009, s. 22). Moreover, they recommend that other systems in which the youth participates (such as schools and athletics) are also integrated into a comprehensive treatment approach to meet the unique needs of young drug abusers (NIDA, 2009, s. 23).

A number of studies and reviews have demonstrated positive results for family therapies. Family therapy covers a range of different interventions and is based on different manuals and varying theoretical sources such as behavioral and cognitive–behavioral theory, structural and strategic family theory, and family systems theory (Austin et al., 2005; Williams, Chang, & Addiction Centre Adolescent Research Group, 2000). Family-based interventions for the treatment of young drug abusers include multidimensional family therapy (MDFT), brief strategic family therapy, functional family therapy (FFT), and family behavior therapy (Alexander & Sexton, 2002; Austin et al., 2005; Rowe & Liddle, 2006; Waldron & Turner, 2008; Waldron, Turner, & Ozechowski, 2006; Williams et al., 2000). Some reviews suggest that these family-based therapies are superior to individual-based programs in reducing youth drug abuse (Lipsey, Tanner-Smith, & Wilson, 2010; Waldron, 1997; Williams et al., 2000). While there is general support for family therapy in the treatment of substance use with young people, there is a need to synthesize individual study results for specific family therapies to determine whether and to what extent family therapy interventions work for young drug abusers (Austin et al., 2005; Deas & Thomas, 2001; Waldron & Turner, 2008; Williams et al., 2000).

MDFT

MDFT, developed in 1985, is a manual-based, family-oriented treatment designed to eliminate drug abuse and associated problems in young people's lives (Liddle, 1999, 2002; Liddle, Rowe, Dakof, Henderson, & Greenbaum, 2009). MDFT is one of several family therapy forms that meet the general characteristics of manual-based family therapies. MDFT treats young people *and* their families as a system throughout treatment and thereby recognizes the important role of the family in the development and treatment of young people's drug abuse problems (Liddle et al., 2001; Muck et al., 2001). MDFT's theory of change hypothesizes that changing the family system constructively will produce changes in youths' drug abuse (reduction or elimination) as well as improvements in relation to other emotional and behavioral problems (A. Hogue, Liddle, Dauber, & Samoulis, 2004; Liddle, Rodriguez, Dakof, Kanzki, & Marvel, 2005). MDFT combines elements of several theoretical frameworks, including family systems theory and developmental psychology (Bronfenbrenner, 1979; Minuchin, 1985; Stroufe & Rutter, 1984), ecosystems theory, and the risk and protective model of adolescent substance abuse (Austin et al., 2005; A. Hogue & Liddle, 1999; Liddle & Hogue, 2000). The influence of ecological and developmental theory in MDFT is evident, as the intervention takes into account the changing environments and multidimensional systems in which young drug abusers reside (Liddle, 2002; Liddle et al., 2001).

Treatment focuses on individual characteristics of the young person, their parents, and other key individuals in the young person's life as well as on the relational patterns contributing to the drug abuse and other problem behaviors. A variety of therapeutic techniques are used to accomplish this and to improve the young person and the family's behaviors, attitudes, and functioning across the variety of domains (Liddle, 1999).

MDFT aims to reorient the young person and family toward a more functional developmental trajectory on the basis of a variety of key principles, including (1) individual biological, social, cognitive, personality, interpersonal, familial, developmental, and social ecological aspects can all contribute to the development, continuation, worsening, and chronicity of drug problems; (2) the relationships with parent(s), siblings, and other family members are fundamental domains of assessment and change; (3) change is multifaceted and multidetermined and relates to the youths' cognitive and psychosocial developmental stages; (4) motivation is not assumed but is malleable and motivating the young person and family members about treatment participation and change is a fundamental therapeutic task; (5) multiple therapeutic alliances are required to create a foundation for change; and (6) therapist responsibility and attitude is fundamental to success (Liddle, 2010).

To produce change, MDFT proposes that therapists focus on parenting skills and family interaction. However, MDFT stresses that this is not necessarily sufficient for a change in the young person's drug abuse. A key idea is that therapists, in addition to working with both internal family factors (such as family patterns and rituals and perceptions of each other and oneself), also need to address external systemic factors (such as peer relations, school, and other prosocial institutions). Thus, MDFT aims at reducing symptoms and enhancing prosocial and normative developmental functions in problem youths, by targeting the family as the foundation for intervention and simultaneously facilitating curative processes in several domains (systems) of the young persons' lives. Particular behaviors, emotions, and thinking patterns related to problem formation and continuation are replaced by new behaviors, emotions, and thinking patterns associated with appropriate intrapersonal and familial development (Liddle, 2002; Liddle, Cecero, Hogue, Dauber, & Stambaugh, 2006).

The comprehensive multidimensional assessment is hypothesized as a key feature in the success of MDFT for young people experiencing multiple problems. Assessment in MDFT provides a therapeutic map, directing therapists where to intervene in the multiple domains of the young person's life. The process involves not only the identification of different problem areas, symptoms, and co-occurring disorders but also risk and protective factors in all relevant domains so that these factors can be targeted for change. Through a series of individual and family interviews, meetings with school, court, and other mental health professionals, and observations of family interactions, the therapist seeks to answer critical questions about functioning in each area. First, assessment is an ongoing process throughout therapy, continually integrated with interventions to calibrate treatment planning and solving. Second, guided by this multidimensional assessment, the model addresses common root factors underlying a range of emotional and behavioral symptoms that co-occur with young persons' drug abuse.

MDFT is organized into three phases, based upon knowledge of what is considered to be normal cognitive and emotional development for young people. Each phase represents one of several targets for assessment, intervention, and change, and the therapist will not progress to the next phase until the therapy has completed the current phase. The three phases structuring the MDFT intervention aim to (1) form therapeutic alliances and build the foundation for therapy, (2) take action and make changes, and (3) seal the changes and guide the family members toward creating a healthy internal relationship. Each phase is implemented through four types of treatment sessions (Liddle, 2002; Liddle, Dakof, Turner, Henderson, & Greenbaum, 2008; Liddle et al., 2006): individual sessions with the young person, sessions with the parent(s), sessions with other family members, and systems external to the family. Sometimes, the assessment of Component 3 is split into two, (a) a component concerning other family members and (b) a component concerning systems external to the family, and thereby five components are presented in some MDFT studies (Liddle, 2002) and sessions to change the parent(s)–young persons interaction(s).

The emphasis on therapists working simultaneously with several systems to produce change in young people's problem behavior is not unique to MDFT. Rather, this is generally emphasized in family therapy approaches (Dakof, Godley, & Smith, 2011). Likewise, these approaches in general also instruct therapists to be highly nonpunitive and nonjudgmental toward youth and parents and stress that therapists should collaborate with youth and parents to develop meaningful, client-driven goals (Dakof et al., 2011). The distinctiveness in MDFT derives from the assembly of theories, methods, and techniques into specific therapeutic principles that guide the intervention step-by-step as outlined in the following section.

Previous reviews (Vaughn & Howard, 2004; Waldron & Turner, 2008) indicate that MDFT is a promising treatment for young drug abusers. However, the only meta-analysis thus far conducted (Waldron & Turner, 2008) included MDFT as part of a broad category of family therapy rather than including MDFT as a distinct treatment model. In contrast, this review examines the effect of MDFT and by aggregating results of all relevant studies on MDFT and so contributes to the knowledge about treatment of young drug abusers and their families. The review informs practice by exploring whether results indicate that MDFT works better for some client groups than others based on characteristics such as age, gender, minority background, family composition (e.g., single parents), and co-occurring conditions. As previous reviews (e.g., Waldron & Turner, 2008) indicate that individual treatment outcomes vary widely within intervention models, it is important to investigate who might benefit the most from MDFT. The hypothesis is that MDFT is not similarly efficacious for all client groups, and the review investigates whether it is possible to identify subgroups that benefit more than others.

Purpose of the Present Study

Drug treatment targeting young drug abusers is challenging and costly, as interventions are often plagued by high dropout rates and posttreatment relapse into drug abuse. Given the growing

interest among policy makers in increasing funding for evidence-based interventions, there is a need to add to the evidence base with a systematic review on promising treatment for young drug abusers. The specific aim of this review was to evaluate current evidence about the effects of MDFT on drug abuse reduction for young people (aged 11–21 years) in treatment for nonopioid drug abuse. Further objectives of this review were to examine the moderators of drug abuse reduction effects and to examine whether MDFT works better for particular groups.

Method

Systematic review methods, following the Campbell Collaboration (2014) guidelines, were used to conduct this study, and the meta-analytic methods were used to synthesize study results. The protocol for this review is registered and published in the Campbell Collaboration library (Rasmussen, Lindstrom, Kowalski, Filges, & Jorgensen, 2012).

Criteria for Considering Studies for This Review

Types of studies. The study designs eligible for inclusion in the review included randomized controlled trials (RCTs), quasi-RCTs, and non-RCTs (NRCTs; in which all parts of the study are prospective, i.e., recruitment of participants, assessment of baseline, allocation to intervention, selection of outcomes, and generation of hypotheses).

Types of participants. The population included in this review was young people aged 11–21 years referred to or in treatment for using nonopioid drugs (e.g., cannabis, amphetamine, ecstasy, or cocaine). Definitions of young people, and the age at which a person is considered a young person and may be entitled to special services such as drug treatment, vary internationally (United Nations, n.d.). Age-group distinctions for young people are unclear, as the boundaries are fluid and culturally specific (Weller, 2006). Furthermore, young people start experimenting with illegal drugs at different ages in different countries (Hibell et al., 2009), and the pattern of movement from dependence on parents to independent living vary internationally. In order to capture international differences, we have set the age range from 11 to 21 years (Danish Youth Council, 2011; Hibell et al., 2009; SAMHSA, 2010; United Nations, n.d.).

Because no universal consensus exists on categories which should be used when classifying drug abusers, and different assessment tools and ways of classifying the severity of drug abuse are applied in different research studies (APA, 2000; Nordegren, 2002; WHO, 2011), we included all participants referred to or in treatment for nonopioid drugs regardless of any formal drug abuse diagnosis. The main criterion for inclusion was that the young person was enrolled to participate in the treatment (i.e., the intervention or a comparison condition). Referral to and enrollment in drug abuse treatment suggests a level of drug abuse such that a significant other or authority (or the young person themselves) has found it necessary to seek treatment.

We did not include any studies where the young drug abuser had been placed outside the family home (e.g., inpatient treatment or incarceration in a locked facility), and this is because MDFT is a family intervention requiring the active participation of the young drug abuser and his or her family with the aim of improving family functioning, and the core condition of the program would be seriously compromised if the young person was not residing within the family home.

Types of interventions. The review included outpatient manual-based MDFT interventions of any duration. The MDFT interventions were required to be interventions that did not include overnight stays in a hospital or other treatment facility.

Types of comparison conditions. Eligible control and comparison conditions included no intervention, wait-list controls, and alternative interventions, as we were interested in both absolute and relative effects. Due to ethical considerations and the nature of the problem (i.e., young people's drug abuse), we anticipated the likelihood of finding a no treatment control group to be small.

Types of outcomes. The primary outcome of interest to this review was abstinence or reduction in drug abuse as measured by, for example, (1) biochemical test (e.g., urine screen measures for drug abuse), (2) self-reported estimates on drug abuse (e.g., time line follow back interview; Sobell & Sobell, 1992), or (3) psychometric scales (e.g., Addiction Severity Index; McLellan, Luborsky, O'Brien, & Woody, 1980). In addition to the primary outcome of interest, we also examined effects on the following secondary outcomes: family functioning; education or vocational involvement; retention (e.g., measured by days in treatment, completion rates, and/or attrition rates); risk behavior, such as crime rates and prostitution; and other adverse effects (e.g., measured by rates of hospitalization, suicide, and over doses). We did not exclude studies on the basis of whether they reported any of these secondary outcomes.

Search Methods for Identification of Studies

One review author (AKJ) ran the searches. We searched 16 international and Nordic bibliographic databases, performed an extensive search for gray literature, and hand-searched five core journals in October 2014. Furthermore, reference lists of relevant reviews were checked, and 10 international experts were contacted to identify unpublished or ongoing studies. For additional details of the search methods, see Filges, Rasmussen, Andersen, and Jørgensen (2015).

Study Selection and Data Extraction

One reviewer (MS) and one member of the review team (SLO) independently read titles and available abstracts of reports and articles identified in the search to exclude reports that were

clearly irrelevant. Citations considered relevant by at least one reviewer were retrieved in full-text versions. If there was insufficient information in the title and abstract to judge relevance, the full text was retrieved. After screening, one review author (PSR) and one member of the review team (SLO) read the full-text versions to ascertain eligibility based on the selection criteria. Any disagreements about eligibility were resolved by discussion and consultation with a third reviewer (KK). Reasons for exclusion have been documented for each study retrieved in full text (see Filges et al., 2015, for reasons for exclusion). The study inclusion screening sheet was piloted and adjusted as required by the review authors and used throughout screening.

Data and information were extracted from each included study on characteristics of participants (e.g., age, gender, and drug abuse history), intervention characteristics and control conditions, research design, sample size, outcomes, and results. One review author (PSR) coded the included studies and a second reviewer (KK) checked the coding. The coding sheet was piloted on several studies. Numeric data extraction was carried out by one review author (TF) and checked by a member of the review team (ADK).

We also assessed the methodological quality of studies using a risk of bias model developed by Professor Barnaby Reeves in association with the Cochrane Nonrandomized Studies Methods Group (Reeves, Deeks, Higgins, & Wells, 2011). This model, an unpublished extension of the existing Cochrane Collaboration's risk of bias tool (J. P. T. Higgins & Green, 2008), covers both risk of bias in RCTs and in NRCTs that have a well-defined control group. The extended model is organized and follows the same steps as the existing Risk of Bias model according to the Cochrane Handbook, Chapter 8 (J. P. T. Higgins & Green, 2008). Reviewers (PSR and KK) independently assessed the risk of bias for each included study. Disagreements were resolved by discussion and consultation with a third reviewer with content and statistical expertise (TF).

Data Analytic Strategy

Measures of treatment effect. Standardized mean differences (SMD) were used as the effect size metric for school grades, family functioning, drug abuse problem severity, and drug abuse frequency. Hedges *g* was used for estimating SMDs, and the data used for these calculations were means, standard deviations, and sample size.

Odds ratios (ORs) were used as the effect size metric for retention, and the data used for these calculations were number of events and sample size. Computations were carried out with the natural logarithm of the OR. Software used for statistical analyses was RevMan 5.0.

Unit of analysis issues. No studies were found with *multiple interventions per individual* or *cluster randomized trials*. For studies with multiple time points, separate analyses were performed for 6 and 12 months postintake. Treatment termination and 6-month follow-up were used as equivalents in two studies (Liddle et al., 2001, 2008). Two studies (Dennis et al., 2004a, 2004b; Liddle et al., 2001) had two comparison groups with different individuals. The control groups were not pooled, and we performed separate analyses including the different control groups, where these two studies provided relevant outcome measures. Assessment of heterogeneity in primary outcome was made with χ^2 (interpreted cautiously due to low statistical power), I^2, and τ^2 statistics (J. P. Higgins, Thompson, Deeks, & Altman, 2003). We were unable to comment on the possibility of publication bias because there were insufficient studies for the construction of funnel plots. Selective reporting has been considered in the risk of bias assessment and the results are reported in the Results section.

Data synthesis. All analyses were inverse variance weighted using random effects statistical models that incorporate both the sampling variance and the between-study variance components into the study-level weights. Random effects weighted mean effect sizes were calculated using 95% confidence intervals (CIs). Graphical displays of effect sizes (forest plots) are provided in the section "Effects of the Interventions" subsequently.

We did not find any studies comparing MDFT to no treatment or to untreated wait-list controls, and so were unable to examine the absolute effects of MDFT. Our analysis of the relative effects of MDFT was conducted on studies that compared MDFT to other interventions and/or to treatment as usual (TAU). All follow-up durations reported in the primary studies were recorded. We performed separate analyses at 6 months and at 12 months postintake.

Subgroup, moderator, and sensitivity analyses. We did not identify sufficient studies to allow any subgroup or moderator analysis to be conducted. Sensitivity analysis was used to evaluate whether the pooled effect sizes were robust across components of risk of bias. We conducted a sensitivity analysis for the incomplete outcome data and other bias components of the risk of bias checklists by removing studies scoring 4 (see the previous section "Assessment of risk of bias in included studies" for a definition).

Results

We identified 6,519 potential relevant records after excluding duplicates (database search, 1,425; gray search, 898; hand search, snowballing, and other resources, 4,196). All 6,519 records were screened based on title and abstract. Of these, 170 were retrieved and screened in full text. One hundred and fifty-four records did not fulfill the screening criteria and were excluded. One paper from the snowball search was included. A total of five unique studies, reported in 16 papers, were included in the review (see Figure 1 for search and selection flowchart).

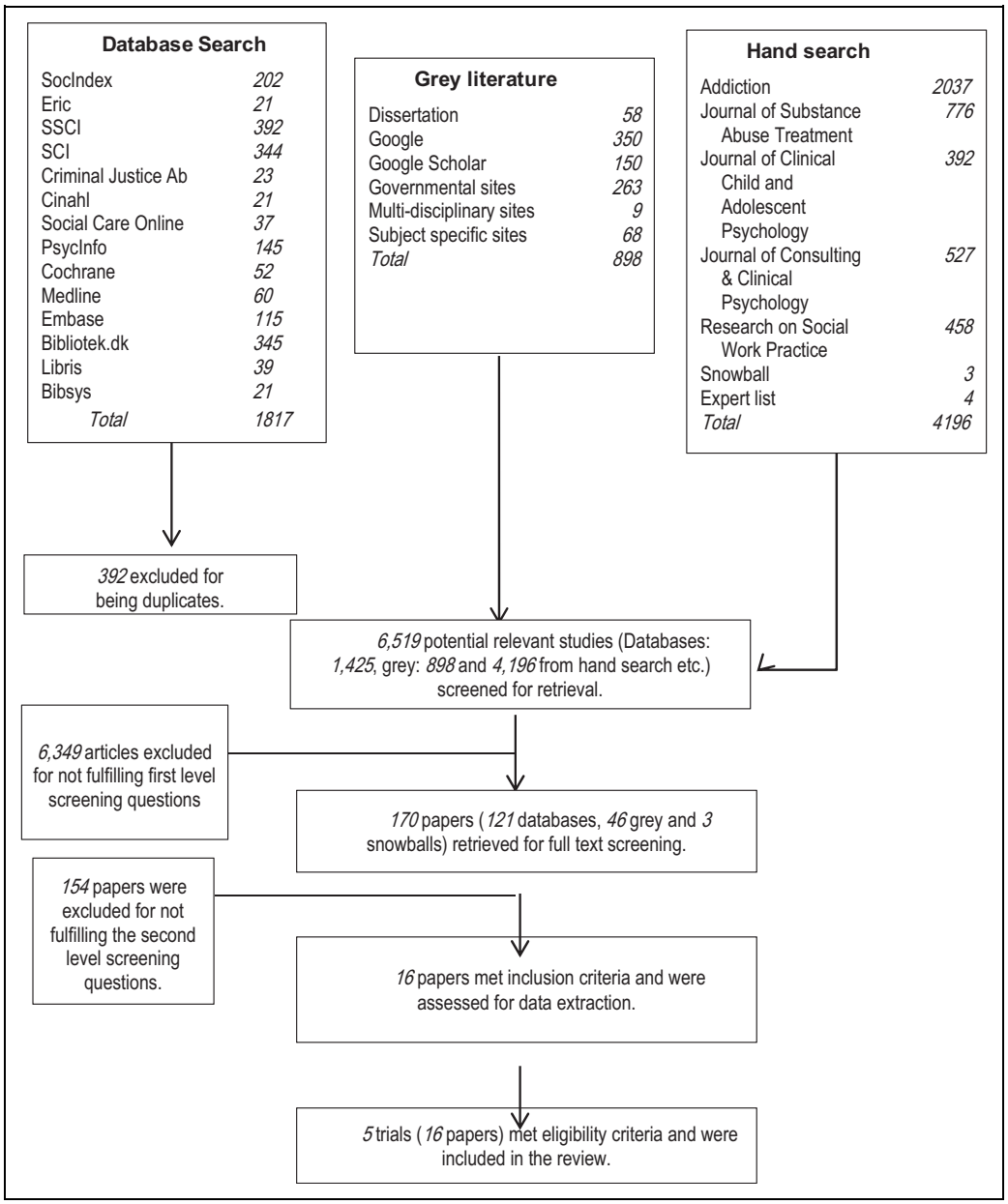

Figure 1. Study selection flowchart.

Description of the Studies

Five studies published in 16 articles between 2001 and 2014 met our inclusion criteria. Four of the included studies were conducted in the United States and one was conducted in five European countries. All included studies were described by investigators as RCTs. Three employed a block randomized design (Dennis et al., 2004a, 2004b; Liddle et al., 2008; Rigter et al., 2011), one study allocated participants using an urn procedure (Liddle et al., 2009), and one study did not report the randomization procedure (Liddle et al., 2001). Three studies were conducted by MDFT program developers (Liddle et al., 2001, 2008,, 2009), one study was ''semi-independent'' (conducted by an independent investigator with the program developer as coauthor; Dennis et al., 2004a, 2004b), and one study was conducted by independent investigators (Rigter et al., 2011). See Table 1 for a summary of the included studies.

Liddle, Rowe, Dakof, Henderson, and Greenbaum (2009). The first study is a RCT on the effects of MDFT on low-income, ethnically diverse young people aged 11–15 years who were drug abusers. It was performed in The Village South, Inc., a nonprofit community drug abuse treatment agency in Miami, FL. The study was reported in three articles: Liddle, Rowe, Dakof, Ungaro, and Henderson (2004); Henderson, Rowe, Dakof, Hawes, and Liddle (2009); and Liddle et al. (2009). We refer to this study as Liddle (2009), unless specific results from the other two papers are addressed, in which case we will cite as Liddle (2004) or Henderson, Rowe, Dakof, Hawes, and Liddle (2009).

Table 1. Characteristics of Included Studies.

Study Name	Country	Sample Size	Age Range (Mean)	Male (%)	Comparison Condition	Substance	Substance Use Outcomes Measured	Secondary Outcomes Measured	Follow-up Time Points
Liddle 2001	US	182	13–18 (15.9)	80	AGT and MEI	Cannabis (49%) and polydrug (51%)	Severity	Family functioning, education, and retention	Posttest, 6 month, and 12 month
Liddle 2008	US	224	12–17.5 (15.4)	81	CBT	Cannabis	Severity and frequency	Retention	Posttest, 6 month, and 12 month
Liddle 2009	US	83	11–15 (13.73)	73	Peer group	Unknown	Severity and frequency	Family functioning and education	Posttest, 6 month, and 12 month
Dennis 2004	US	300	12–18 (—)	81	ACRA, MET/CBT5	Cannabis	Severity and frequency	Retention	3, 6, 9, and 12 months
Rigter 2011	Germany, France, the Netherlands, Belgium, and Switzerland	450	13–18 (16.3)	86	TAU (CBT/ psychodynamic approaches)	Cannabis	Severity and frequency	Family functioning and risk behavior	3, 6, 9, and 12 months

Note. US = United States; AGT = adolescent group therapy; MEI = multifamily educational therapy; CBT = cognitive–behavioral therapy; ACRA = adolescent community reinforcement approach; MET/CBT5 = CBT-informed individual therapy; TAU = treatment as usual.

Dennis et al. (2004a, 2004b). This is a RCT on the effects of MDFT on drug (primarily cannabis) with young people aged 12–18 years, conducted at two different sites in Philadelphia, United States (The study refers to four different sites, due to there being two trials in the study, but only one of the trials concerns MDFT). The study was published as Shelef, Diamond, Diamond, and Liddle (2005) as Dennis et al. (2004a, 2004b). This study will be referred to as Dennis (2004).

Liddle et al. (2001). This is a RCT on the effects of MDFT on drug using 13- to 18-year-olds conducted in the United States at an unspecified location. This study will be referred to as Liddle (2001).

Liddle, Dakof, Turner, Henderson, and Greenbaum (2008). This is a RCT on the effects of MDFT with drug using 13- to 17-year-olds who were primarily African American and from low-income families. The study was conducted in the Northeast United States, at unspecified locations, and was published in four articles: Henderson, Dakof, Greenbaum, and Liddle (2010); A. Hogue, Dauber, Samuolis, and Liddle (2006); A. Hogue et al. (2008); Liddle et al. (2008). This study will be referred to as Liddle (2008).

Rigter et al. (2011). This study is a RCT on the effects of MDFT with 13- to 18-year-olds with a cannabis use disorder. The study (also termed the International Cannabis Need of Treatment [INCANT] trial) was conducted in five European countries: Germany, France, the Netherlands, Belgium, and Switzerland, and the project leader and The University of Miami Center for Treatment Research on Adolescent Drug Abuse staff from Miami visited the nominated centers in each country. They then selected the following centers: the department of psychiatry of Brugmann University Hospital in Brussels, Therapieladen in Berlin, Center Emergence in Paris with suburban CEDAT (Conseils Aide et Action contre le Toximanie) subsites in Mantes la Jolie and St Germain en Laye, and the twinning sites of Parnassia Brijder (Mistral, youth addiction care) and De Jutters (Palmhuis, youth forensic care) in The Hague. All these sites did well in the pilot study and joined the INCANT trial. In Switzerland, the pilot study sites in Zurich, Basel, and Bern were replaced by Phénix (Geneva) for the actual trial, as the potential for recruiting substance abusing adolescents was better there. This study was published in four articles: Rigter et al. (2013), Phan et al. (2011), Schaub et al. (2014), and Rigter et al. (2011). This study will be referred to as Rigter (2011).

Risk of Bias in Included Studies

The included studies varied on risk of bias judgments, and no single study could be characterized as a robust RCT with low risk of bias on all assessed risk of bias items. The ratings of each study in relation to the nine domains in the Risk of Bias tool are summarized in Table 2. Overall, all studies were RCTs, with two studies (Liddle, 2001, 2009) having used blinding in the allocation procedure. Two studies had very low levels of missing data (Dennis, 2004; Liddle, 2009), and *two* studies had relatively high levels (Liddle, 2001, 2008). All except one study (Liddle, 2001) dealt with missing data. In regard to selective reporting, all studies reported data on the primary outcome reduction in substance abuse. We were able to locate a protocol and an a priori analysis plan for two studies (Dennis, 2004; Rigter, 2011). The predictability of treatment assignment is an issue for all constrained randomization algorithms. None of the studies were rated 1 (low risk of bias) on this domain: Dennis (2004), Liddle (2008), and Rigter (2011) because block randomization was used; Liddle (2009) because an urn procedure was used; and Liddle (2001) because the randomization procedure was not described. Confounding was not relevant in the review, since we did not find any NRCTs meeting the inclusion criteria.

Table 2. Risk of Bias Assessment.

Risk of Bias Domain	Rigter 2011	Liddle 2001	Liddle 2008	Dennis 2004	Liddle 2009
Sequence generation	L	U	L	L	L
Allocation concealment	L	U	U	L	U
Blinding outcome assessors					
Primary outcomes	3	I	U	U	I
Secondary outcomes	3	U	U	U	I
Incomplete outcome data					
Primary outcomes	3	4	4	I	I
Secondary outcomes	3	4	n/a	I	I
Free of selective reporting					
Primary outcomes	I	I	I	I	I
Secondary outcomes	4	2	n/a	4	I
Retention	I		3	I	U
A priori protocol	Yes	U	U	Yes	U
A priori analysis plan	Yes	U	U	Yes	U
Free of other bias	4	U	4	3	2

Note. In the 5-point scale, 1 corresponds to *low risk of bias* and 5 corresponds to *high risk of bias*. L = low risk of bias; H = high risk of bias; U = unclear risk of bias; n/a = not applicable.

Effects of the Interventions on Primary Outcomes

It was possible to measure reduction in drug abuse by drug abuse *frequency* reduction as well as by reduction in drug abuse *problem severity*. All five studies provided data that enabled the calculation of comparable effect sizes on drug abuse problem severity reduction, while four studies provided data that enabled the calculation of comparable effect sizes on drug abuse frequency reduction. One study, Liddle (2001), provided a drug abuse classification scheme as the only measure of drug abuse reduction. We judged that the drug abuse classification scheme compared best with the measures of drug abuse problem severity provided in the other studies. Drug abuse frequency and problem severity reduction are measured as decreases, hence a negative effect size favors MDFT.

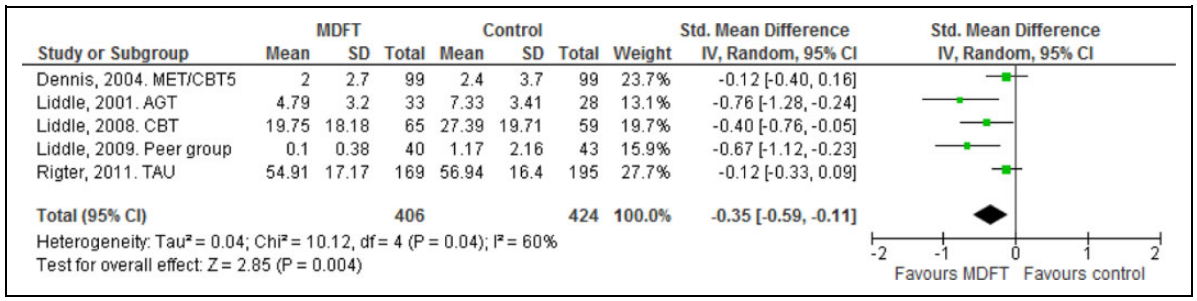

Figure 2. Drug abuse problem severity at 6 months postintake 1A.

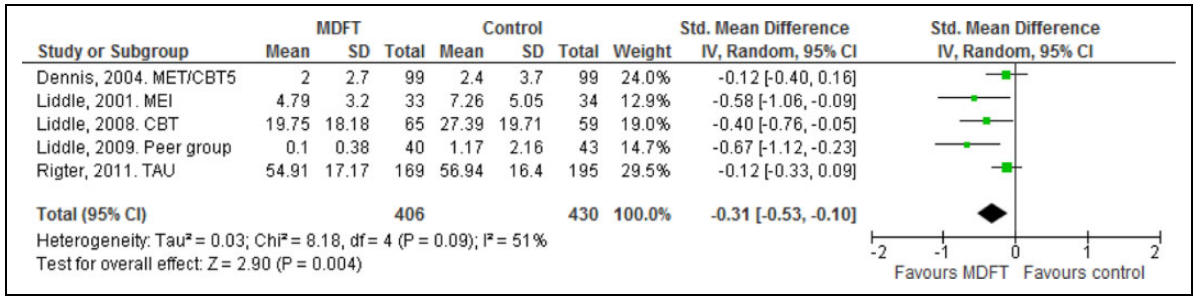

Figure 3. Drug abuse problem severity at 6 months postintake 2A.

MDFT was compared to other interventions in all the included studies, and so we were only able to analyze the relative effects of MDFT. Two studies, Liddle (2001) and Dennis (2004), had two comparison groups with different individuals, and we performed separate analyses including the different control groups, where these two studies provided relevant outcome measures. In Dennis (2004), one comparison intervention was CBT-informed individual therapy (multifamily educational therapy[MET]/CBT5), and the second comparison was Adolescent Community Reinforcement Approach (ACRA). In Liddle (2001), the two comparison interventions were MEI and adolescent group therapy (AGT). For purposes of reporting results with the different arms of the included studies, we labeled the different comparison groups as follows: 1 refers to the AGT comparison group in Liddle (2009), 2 refers the MEI comparison group in Liddle (2001), A refers to the MET/CBT5 comparison group in Liddle (2001), and B refers to the ACRA comparison group in Dennis (2004). For example, the analysis labeled 1A would have used the AGT comparison group from Liddle (2009) and the MET/CBT5 comparison group from Liddle (2001).

Drug abuse problem severity 6 months postintake. All five studies examined drug use problem severity at 6 months postintake. Pooled results showed a statistically significant effect of MDFT for drug abuse problem severity reduction. The random effects weighted SMD for Analysis 1A was −0.35 (95% CI = [−0.59, −0.11], $p = .004$), for Analysis 1B, SMD = −0.33 (95% CI = [−0.59, −0.08], $p = .01$), for Analysis 2A, SMD = −0.31 (95% CI = [−0.53, −0.10], $p = .004$), and for Analysis 2B, SMD = −0.30 (95% CI = [−0.53, −0.07], $p = .01$). There was a statistically significant heterogeneity of effects between studies in Analysis 1A ($\tau^2 = .04$; $Q = 10.12$, $p = .04$), Analysis 1B ($\tau^2 = .05$, $Q = 11.67$, $p = .02$), and Analysis 2B ($\tau^2 = .04$; $Q = 9.64$, $p = .05$). In Analysis 2A, there was no statistical significant heterogeneity ($\tau^2 = .03$; $Q = 8.18$, $p = .09$). The forest plots for Analyses 1A and 2A are displayed in Figures 2 and 3. For forest plots for Analyses 1B and 2B, see Filges, Rasmussen, Andersen, and Jørgensen (2015).

Drug abuse problem severity 12 months postintake. All five included studies examined drug abuse severity at 12 months postintake. Pooled results showed a statistically significant effect of MDFT for drug abuse problem severity reduction. The random effects weighted SMD for Analysis 1A was −0.25 (95% CI = [−0.39, −0.10], $p = .0007$), for Analysis 1B, SMD = −0.23 (95% CI = [−0.39, −0.06], $p = .007$), for Analysis 2A, SMD = −0.27 (95% CI = [−0.43, −0.11, $p = .001$), and for Analysis 2B, SMD = −0.25 (95% CI = [−0.43, −0.07], $p = .007$). Heterogeneity of effects among studies was not statistically significant in Analysis 1A ($\tau^2 = .00$; $Q = 4.19$, $p = .38$), analysis 1B ($\tau^2 = .01$; $Q = 5.26$, $p = .26$), Analysis 2A ($\tau^2 = .01$; $Q = 4.97$, $p = .29$), and Analysis 2B ($\tau^2 = .01$; $Q = 6.17$, $p = .19$). The forest plots for Analysis 1A and 2A are displayed in Figures 4 and 5. For forest plots for Analyses 1B and 2B, see Filges et al. (2015).

Drug abuse frequency 6 months postintake. Four studies reported data on the drug abuse frequency reduction (Dennis, 2004;

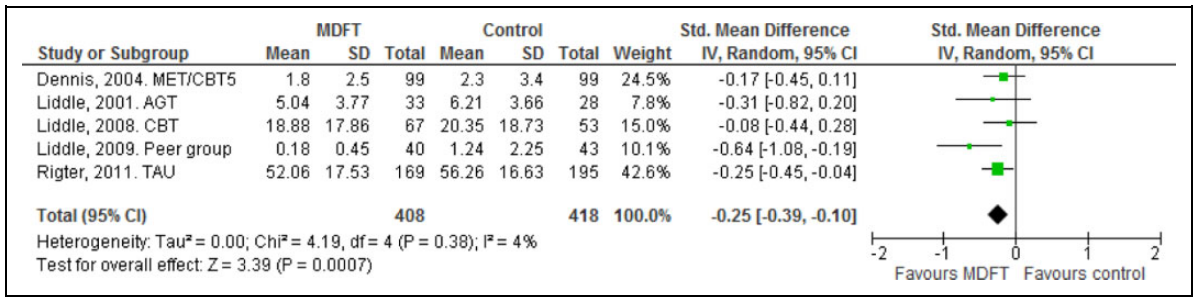

Figure 4. Drug abuse problem severity at 12 months postintake 1A.

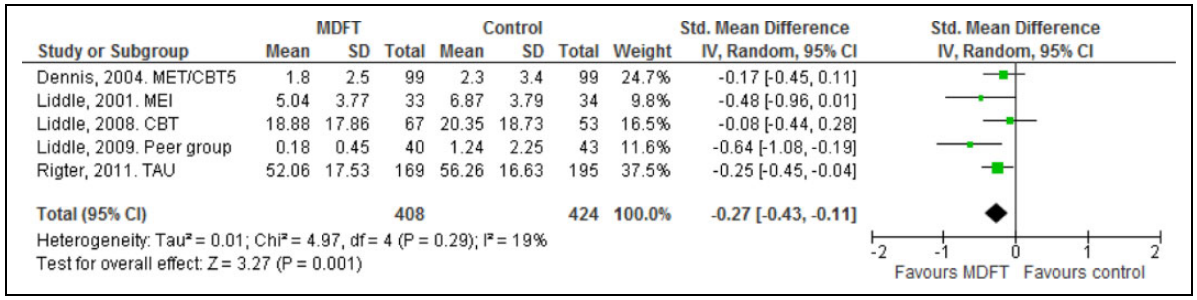

Figure 5. Drug abuse problem severity at 12 months postintake 2A.

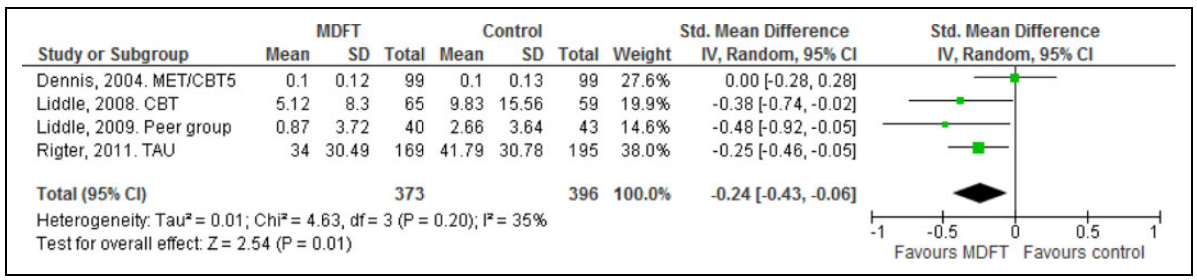

Figure 6. Drug abuse frequency at 6 months postintake A.

Liddle, 2008, 2009; Rigter, 2011). The random effects weighted SMD for Analysis A was −0.24 (95% CI = [−0.43, −0.06], p = .01) and for Analysis B, SMD = −0.25 (95% CI = [−0.40, −0.11], p = .0007). Heterogeneity of effects among studies was not statistically significant in Analysis A (τ^2 = .01; Q = 4.63, p = .2) and Analysis B (τ^2 = .00, Q = 3.11, p = .37). The forest plot for Analysis A is displayed in Figure 6. Forest plot for Analysis B can be found in Filges et al. (2015).

Drug abuse frequency 12 months postintake. Four studies measured drug abuse frequency at 12 months postintake. Pooled results showed no statistically significant effect of MDFT for drug abuse frequency reduction. The random effects weighted SMD for Analysis A was −0.28 (95% CI = [−0.63, 0.07], p = .11) and for Analysis B, SMD = −0.28 (95% CI = [−0.63, 0.07], p = .11). There was a statistically significant heterogeneity of effects among studies in Analysis A (τ^2 = .10; Q = 15.43, p = .001) and Analysis B (τ^2 = .10; Q = 15.45, p = .001). The forest plot for Analysis A is displayed in Figure 7. For forest plot for Analysis B, see Filges et al. (2015).

Effects of Interventions on Secondary Outcomes

Family functioning. It was not possible to perform a meta-analysis on family functioning; however, three studies provided data to calculate an effect size on at least one measure of family functioning. One study, Liddle (2001), used a rating scale that assessed the degree of family functioning from 1 (*optimal functioning*) to 10 (*severely dysfunctional*). Family functioning was measured as a decrease, hence a negative effect size favors MDFT. Results showed no significant differences between MDFT and the MEI treatment either at 6 months postintake (SMD = 0.25; 95% CI = [−0.23, 0.73]) or at 12 months postintake (SMD = −0.34; 95% CI = [−0.82, 0.15]). Results showed no significant differences between MDFT and the AGT

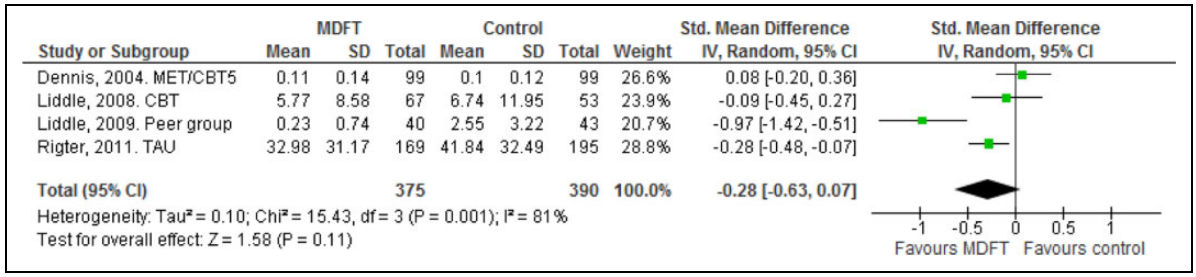

Figure 7. Drug abuse frequency at 12 months postintake A.

treatment at 6 months postintake (SMD = −0.30; 95% [CI = −0.80, 0.21]), but a significant difference which favored MDFT at 12 months postintake (SMD = −1.26; 95% CI = [−1.81, −0.70]). Liddle (2009) measured family functioning in terms of positive and negative family interactions. Results showed no significant differences between MDFT and the peer group on positive or negative family interactions at 6 or 12 months postintake. Rigter (2011), reported in Schaub et al. (2014), measured family functioning in terms of conflict and cohesion. Results showed no significant differences on conflict or cohesion between MDFT and the TAU comparison at 6 or 12 months postintake. The full results including forest plots can be found in Filges et al. (2015).

Education or vocational outcomes. Two studies (Liddle, 2001, 2009) provided data that enabled the calculation of an effect size for grade point average at 6 months postintake. Pooled results did not show a statistically significant effect of MDFT for school grade improvement at 6 months postintake when using the AGT comparison in the Liddle (2001; SMD = 0.38; 95% CI = [−0.25, 1.01]) and a marginal statistically significant effect when using the MEI comparison in Liddle (2001; SMD = 0.47; 95% CI = [0.01, 0.92]). There was no statistically significant heterogeneity between studies in any of the analyses ($\tau^2 = .15$; $Q = 3.54$, $p = .06$ and $\tau^2 = .05$, $Q = 1.96$, $p = .05$). However, the magnitude of the effect sizes differ markedly, and with only two studies, the power to detect heterogeneity is very low. Forest plots can be found in Filges et al. (2015).

Retention. We used the information reported in all five studies to examine retention. Results were measured as *OR* nonevent, implying that an *OR* of less than one favors MDFT. Three studies (Dennis, 2004; Liddle, 2001, 2008) found no difference between retention rates. In the remaining two studies, the difference between retention rates between treatments favored MDFT (Liddle, 2009; Rigter, 2011) and was statistically significant. Note that the magnitudes of the effect sizes of these two studies and the width of the CIs were quite distinct from the three other studies (Dennis, 2004; Liddle, 2001, 2008). Pooled results showed a statistically significant effect of MDFT for retention when using the AGT comparison in Liddle (2001), but the effect was not statistically significant when using the MEI comparison in Liddle (2001). The random effects weighted *OR* for Analysis 1A was 0.44 (95% CI = [0.21, 0.94], $p = .03$), for Analysis 1B, *OR* = 0.45 (95% CI = [0.21, 0.95], $p = .04$), for Analysis 2A, *OR* = 0.48 (95% CI = [0.22, 1.05], $p = .07$), and for Analysis 2B, *OR* = 0.49 (95% CI = [0.22, 1.07], $p = .07$). There was statistically significant heterogeneity of effects among studies in all analyses. See Filges et al. (2015) for the forest plots.

Risk behavior. One study, Rigter (2011), provided data on externalizing disorders/symptoms (e.g., aggression and delinquency) measured by the Youth Self-report and the Child Behavior Checklist, and another study, Liddle et al. (2009), reported delinquency. Results showed no significant differences between MDFT and TAU on either of the scales. No significant differences between MDFT and peer group were found at 6 months postintake. Full results and forest plots can be found in Filges et al. (2015).

Other adverse effects. No other adverse effects (such as rates of hospitalization, suicide, or over doses) were provided in any of the five studies.

Sensitivity analysis. Sensitivity analyses were performed for the primary outcomes, drug abuse problem severity, and drug abuse frequency. We examined the robustness of conclusions when the studies scoring 4 on the incomplete outcome data item (Liddle, 2001, 2008) and the other bias item (Liddle, 2008; Rigter, 2011), respectively, were removed from the analyses. For drug abuse problem severity, the SMD remains statistically significant and still favors MDFT for most of the comparisons at the 12 months postintake when the studies scoring 4 are removed. However, the effect becomes no longer significant at 6 months postintake when studies scoring 4 on the incomplete outcome data item are removed. The relative reduction remains significant and becomes larger for two of the contrasts (1A and 2A) at 6 months postintake when studies scoring 4 on the other bias item are removed. In both cases, the relative reduction becomes marginally larger at 12 months postintake. As expected, when studies are removed from the analysis, the CIs become wider, and there is however considerable overlap between CIs. For drug use frequency, the SMD ceases to be statistically significant for most of the comparisons when studies scoring 4 are removed. At 6 months postintake, the results are no longer statistically significant when the comparison used in

Dennis (2004) is MET/CBT5, whereas they are still statistically significant when the comparison used in Dennis (2004) is ACRA. See Filges et al. (2015) for full results of the sensitivity analyses.

Discussion and Application to Practice

Our main objective was to evaluate the current evidence on the effect of MDFT on drug abuse reduction for young people in treatment for nonopioid drug abuse. Further objectives of this review were to examine the moderators of drug abuse reduction effects and to examine whether MDFT works better for particular groups. Unfortunately, it was not possible to assess this second review objective because of the limited number of studies. Five RCTs of MDFT met the inclusion criteria for this review. All five studies compared MDFT to other treatments, mainly CBT or "CBT-informed" interventions, thus, it was not possible to analyze the absolute effect of MDFT. Two studies, Liddle (2001) and Dennis (2004), had two comparison groups with different individuals, and the Rigter (2011) study was carried out in five different countries with TAU as the comparison condition, which varied across countries.

The present study findings indicate that MDFT was more effective for reducing drug use problem severity and frequency at 6 months and for reducing drug use problem severity at 12 months postintake compared to youth who received CBT, TAU, MET/CBT5, and ACRA. The pooled effect sizes are, however, small and CIs are often close to zero. The statistical significance of the pooled results is sensitive to the removal of studies with methodological weaknesses at 6 months postintake but not at 12 months postintake. The available data thus support the hypothesis that there is an effect on drug abuse problem severity and frequency reduction for youth who receive MDFT compared to other treatments. However, the effect appears to vanish 12 months after intake for drug use frequency.

Although drug use frequency and severity were the primary outcomes examined in this study, authors of the included studies also measured a number of other variables, including family functioning, school grades, and retention. It was not possible to perform a meta-analysis on family functioning, as only three studies provided data and the measures used were not comparable. However, there was a lack of evidence of positive effects of MDFT on family functioning compared to MEI, peer group, and TAU at time point and AGT at 6 months postintake. Two studies reported school grades, and however, only data at 6 months postintake were provided. Meta-analysis favored MDFT compared to peer group and AGT/MEI. However CIs were wide and inconsistent across comparison groups used in the analysis. In terms of the effects of MDFT on retention, the results indicate that retention may be positively affected by structured MDFT treatment compared to the less structured control conditions of CBT, TAU, MET/CBT5, and ACRA.

The present review improves upon and expands prior narrative and quantitative reviews. Overall, prior reviews generally supported MDFT but were largely based on one or few included studies and many did not quantitatively synthesize effects across studies. Vaughn and Howard (2004) examined several interventions for drug-using youth, and the conclusions concerning MDFT were based solely on Liddle (2001) with the authors concluded that MDFT met evidence of clinically meaningful effect. Waldron and Turner (2008) and Bender, Tripodi, Sarteschi, and Vaughn (2011) used meta-analysis to evaluate various interventions, including family therapy, individual therapy, CBT (individual and group), and "minimal treatment control conditions," for drug-using youth. Both reviews concluded that MDFT, along with other interventions evaluated (e.g., FFT and group CBT), was effective in the treatment of drug-using youth.

Although there is some evidence that MDFT may be effective in the treatment of substance use with youth on certain outcomes, we agree with prior reviews that more research is needed, particularly with regard to moderators and identification of particular subgroups of youth who may be more likely to respond to specific interventions. We had planned to assess moderators in the present review. However, the lack of empirical evidence obscured the possibility of assessing moderators of effect and effects on subgroups.

Although this review improves upon and expands upon prior reviews, consideration should be given to the limited number of studies providing data that enable a calculation of an effect size regarding drug abuse reduction. The conclusions that can be drawn from using MDFT to treat young drug abusers compared to other treatments would be more convincing if more studies were available. The pooled effect sizes are small and CIs are often close to zero. Moreover, while all five included studies were RCTs, none can be characterized as a robust RCT with low risk of bias on all assessed risk of bias items. Four of the five studies originated from North America, which may limit the applicability of the evidence to a specific social and cultural setting and may limit generalizability of the present study's findings. Three of the included studies were conducted by MDFT program developers, and one study was conducted by an independent investigator with a program developer as a coauthor; thus, these studies may be biased in favor of MDFT and thus upwardly bias the mean effects. This indicates a need for more well-conducted studies of MDFT interventions in countries other than United States and by independent investigators. Concerning limitations in the review process, the narrow search strategy performed in this review may limit the likelihood of finding all relevant studies. However, we attempted to minimize the risk of missing relevant studies by conducting an extensive search for gray literature, an extensive hand search, and by contacting international experts within the field of MDFT. Indeed, the large number of gray literature and hand-searched literature that has been assessed for relevance attests to this effort.

Conclusion

Although most of the few available studies on effectiveness are characterized by methodological problems, the results of this review suggest that MDFT seems to "work" in the sense that

the intervention results, on average, in a slightly higher reduction in drug abuse for youth who received MDFT compared to youth who received other active treatments. In addition to knowledge of whether a certain intervention works, in the sense that it is effective for the average individual, practitioners need knowledge about potential differential effects on treatment. Highly relevant participant characteristics, such as age, gender, minority background, family composition (e.g., single parents), and co-occurring conditions are potential predictors of treatment outcome, and practitioners may need to tailor the program to particular types of young drug abusers. Unfortunately, it was not possible to examine which particular subgroups of youth may be more likely to respond to specific interventions and subsequently how treatments could be adapted or tailored to the individual needs of a young person because there were not enough studies to parse out more nuanced effects.

Programs for drug using youth are costly, and it is also possible that such initiatives have potential to cause harm to some individuals. The available evidence points to small effect sizes of MDFT in comparison to other treatments. Taking the individual variation in treatment effects into consideration, we cannot rule out the possibility that MDFT may be counterproductive for some individuals. It is important to consider the possibility of adverse effects of these interventions. The popular belief is that MDFT and other family therapy approaches are harmless, but very little research has been conducted that focuses on the potential harm of such family therapy approaches.

In addition to potential harm, it is crucial to learn more about differential effectiveness and cost benefits of MDFT in order to determine where money is best allocated as well as to understand which, if any, youth benefit more or less than others. A small body of evidence exists in relation to the treatment of young drug abusers, with only a very modest number of controlled evaluations of treatments for this group. Most of the few available studies of effectiveness have methodological problems, such as small sample size and varied methods of assessing drug abuse. Such problems make definitive conclusions difficult. Well-designed, RCTs within this population are needed and should be reported clearly in accordance with the principles of the CONSORT 2010 statement (cite). In addition, longer follow-up data should be available in future studies.

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Authors' Note

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Declaration of Conflicting Interests

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References

References denoted with * are the included studies. A reference denoted with ** indicates the primary reference.

Alexander, J. F., & Sexton, T. L. (2002). Functional family therapy: A model for treating high-risk adolescents, acting-out youth. In F. W. Kaslow (Eds.), *Comprehensive handbook of psychotherapy* (Vol. 4, pp. 111–132). New York, NY: John Wiley.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). *DSM-IV*. Washington, DC: Author.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). *DSM-IV-TR*. Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (4th ed.). *DSM-V*. Washington, DC: Author.

Austin, A. M., Macgowan, M. J., & Wagner, E. F. (2005). Effective family-based interventions for adolescents with substance use problems: A systematic review. *Research on Social Work Practice*, *15*, 67–83.

Bender, K., Tripodi, S. J., Sarteschi, C., & Vaughn, M. G. (2011). A meta-analysis of interventions to reduce adolescent cannabis use. *Research on Social Work Practice*, *21*, 153–164.

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.

Campbell Collaboration. (2014). Campbell systematic reviews: Policies and guidelines. *Campbell Systematic Reviews: Supplement 1*. doi:10.4073/csrs.2014.1

Dakof, G. A., Godley, S. H., & Smith, J. E. (2011). The adolescent community reinforcement approach and multidimensional family therapy. In Y. Kaminer & K. C. Winters (Eds.), *Clinical manual of adolescent substance abuse treatment* (pp. 239–268). Washington, DC: American Psychiatric Publishing.

Danish Youth Council. (2011). *Definition of youth and young people*. Retrieved from http://duf.dk/english/

Deas, D., & Thomas, S. (2001). An overview of controlled studies of adolescent substance abuse treatment. *The American Journal on Addictions*, *10*, 178–189.

*Dennis, M., Godley, S. H., Diamond, G., Tims, F. M., Babor, T., Donaldson, J., . . . Funk, R. (2004a). Appendix for—The Cannabis Youth Treatment (CYT) Study: Main findings from two randomized trials. *Journal of Substance Abuse Treatment*. Retrieved from www.chestnut.org/li/downloads/Dennis_et_al_CYT_MF_Appendix.pdf

**Dennis, M., Godley, S. H., Diamond, G., Tims, F. M., Babor, T., Donaldson, J., . . . Funk, R. (2004b). The Cannabis Youth Treatment (CYT) study: Main findings from two randomized trials. *Journal of Substance Abuse Treatment*, *27*, 197–213.

Essau, C. A. (2006). Epidemiological trends and clinical implications of adolescent substance abuse in Europe. In H. A. Liddle & C. L. Rowe (Eds.), *Adolescent substance abuse—Research and clinical advances* (pp. 129–147). New York, NY: Cambridge University Press.

European Monitoring Centre for Drugs and Drug Addiction. (2010). *Annual report 2010—The state of the drug problem in Europe*. Luxembourg: Office for Official Publication of the European Communities.

Filges, T., Rasmussen, P. S., Andersen, D., & Jørgensen, A. M. K. (2015). Multidimensional family therapy (MDFT) for young people in treatment for non-opioid drug use: A systematic review. *Campbell Systematic Reviews*, *11*, 1–125.

Health Canada. (2011). *Canadian alcohol and drug use monitoring survey*. Retrieved November 11, 2011, from www.hc-sc.gc.ca

*Henderson, C. E., Dakof, G. A., Greenbaum, P. E., & Liddle, H. A. (2010). Effectiveness of multidimensional family therapy with higher severity substance-abusing adolescents: Report from two randomized controlled trials. *Journal of Consulting and Clinical Psychology*, *78*, 885–897.

*Henderson, C. E., Rowe, C. L., Dakof, G. A., Hawes, S. W., & Liddle, H. A. (2009). Parenting practices as mediators of treatment effects in an early-intervention trial of multidimensional family therapy. *American Journal of Drug and Alcohol Abuse*, *35*, 220–226.

Hibell, B., Guttormsson, U., Ahlström, S., Balakireva, O., Bjarnason, T., Kokkevi, A., & Kraus, L. (2009). *The 2007 ESPAD report. Substance use among students in 35 European countries*. Stockholm, Sweden: The Swedish Council for Information on Alcohol and Other Drugs.

Higgins, J. P., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal*, *327*, 557–560.

Higgins, J. P. T., & Green, S. (Eds.). (2008). *Cochrane handbook for systematic reviews of interventions*. Chichester, England: Wiley-Blackwell.

*Hogue, A., Dauber, S., Samuolis, J., & Liddle, H. A. (2006). Treatment techniques and outcomes in multidimensional family therapy for adolescent behaviour problems. *Journal of Family Psychology: JFP*, *20*, 535–543.

*Hogue, A., Henderson, C. E., Dauber, S., Barajas, P. C., Fried, A., & Liddle, H. A. (2008). Treatment adherence, competence, and outcome in individual and family therapy for adolescent behaviour problems. *Journal of Consulting and Clinical Psychology*, *76*, 544–555.

Hogue, A., & Liddle, H. A. (1999). Family-based preventive intervention: An approach to preventing substance use and antisocial behaviour. *American Journal of Orthopsychiatry*, *69*, 278–293.

Hogue, A., Liddle, H. A., Dauber, S., & Samoulis, J. (2004). Linking session focus to treatment outcome in evidence-based treatments for adolescent substance abuse. *Psychotherapy: Theory, Research, Practice, Training*, *41*, 83–96.

Johnston, L. D., O'Malley, P. M., Miech, R. A., Bachman, J. G., & Schulenberg, J. E. (2014). *Monitoring the future national survey results on drug use: 1975–2013: Overview, key findings on adolescent drug use*. Ann Arbor, MI: Institute for Social Research, The University of Michigan.

Liddle, H. A. (1999). Theory development in a family-based therapy for adolescent drug abuse. *Journal of Clinical Child Psychology*, *28*, 521–532.

Liddle, H. A. (2002). *(MDFT manual): Multidimensional family therapy for adolescent cannabis users, Cannabis Youth Treatment (CYT) Series* (Vol. 5, DHHS Pub. No. 02–3660). Rockville, MD: Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services Administration.

Liddle, H. A. (2010). Multidimensional family therapy: A science-based treatment system. *The Australian and New Zealand Journal of Family Therapy*, *31*, 133–148.

Liddle, H. A., Cecero, J. J., Hogue, A., Dauber, S., & Stambaugh, L. F. (2006). Early therapeutic alliance and treatment outcome in individual and family therapy for adolescent behaviour problems. *Journal of Consulting and Clinical Psychology*, *74*, 121–129.

**Liddle, H. A., Dakof, G. A., Parker, K., Diamond, G. S., Barrett, K., & Tejeda, M. (2001). Multidimensional family therapy for adolescent drug abuse: Results of a randomized clinical trial. *The American Journal of Drug and Alcohol Abuse*, *27*, 651–688.

**Liddle, H. A., Dakof, G. A., Turner, R. M., Henderson, C. E., & Greenbaum, P. E. (2008). Treating adolescent drug abuse: A randomized trial comparing multidimensional family therapy and cognitive behaviour therapy. *Addiction*, *103*, 1660–1670.

Liddle, H. A., & Hogue, A. (2000). A family-based, developmental-ecological preventive intervention for high-risk adolescents. *Journal of Marital and Family Therapy*, *26*, 265–279.

Liddle, H. A., Rodriguez, R. A., Dakof, G. A., Kanzki, E., & Marvel, F. A. (2005). Multidimensional family therapy: A science-based treatment for adolescent drug abuse. In J. L. Lebow (Ed.), *Clinical family therapy* (pp. 128–163). Hoboken, NJ: John Wiley.

**Liddle, H. A., Rowe, C. L., Dakof, G. A., Henderson, C. E., & Greenbaum, P. E. (2009). Multidimensional family therapy for young adolescent substance abuse: Twelve-month outcomes of a randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *77*, 12–25.

*Liddle, H. A., Rowe, C. L., Dakof, G. A., Ungaro, R. A., & Henderson, C. E. (2004). Early intervention for adolescent substance abuse: Pretreatment to posttreatment outcomes of a randomized clinical trial comparing multidimensional family therapy and peer group treatment. *Journal of Psychoactive Drugs*, *36*, 49–63.

Lynskey, M., & Hall, W. (2000). The effects on adolescent cannabis use on educational attainment: A review. *Addiction*, *95*, 1621–1630.

McLellan, A. T., Luborsky, L. O., O'Brien, C. P., & Woody, G. E. (1980). An improved evaluation instrument for substance abuse patients: The addiction severity index. *Journal of Nervous and Mental Disease*, *168*, 26–33.

Minuchin, P. (1985). Families and individual development: Provocations from the field of family therapy. *Child Development*, *56*, 289–302.

Muck, R., Zempolich, K. A., Titus, J. C., Fishman, M., Godley, M. D., & Schwebel, R. (2001). An overview of the effectiveness of adolescent substance abuse treatment models. *Youth & Society*, *33*, 143–168.

Najavits, L. M., & Weiss, R. D. (1994). Variations in therapist effectiveness in the treatment of patients with substance use disorders: An empirical review. *Addiction*, *89*, 679–688.

National Institute on Drug Abuse. (2009). *Principles of drug addiction treatment*. Bethesda, MD: National Institutes of Health.

National Survey on Drug Use and Health, The Report. (2007). *Young adult's need for and receipt of alcohol and illicit drug use treatment: 2007*. Office of Applied Studies, Substance Abuse and Mental Health Service Administration. Retrieved November 2, 2009, from http://www.oas.samhsa.gov/2k9/157/YoungAdultsDrugTxt.htm

Nordegren, T. (2002). *The A-Z encyclopedia of alcohol and drug abuse*. Parkland, FL: Brown Walker Press.

Nordstrom, B. J., & Levin, F. R. (2007). Treatment of cannabis use disorders: A review of the literature. *The American Journal on Addiction*, *16*, 331–342.

Office of National Drug Control Policy. (2000). *Drug-related crime* [Fact sheet]. Drug Policy Information Clearinghouse. Retrieved from https://www.ncjrs.gov/ondcppubs/publications/pdf/ncj181056.pdf

*Phan, O., Henderson, C. E., Angelidis, T., Weil, P., van Torn, M., Rigter, R., . . . Rigter, H. (2011). European youth care sites serve different populations of adolescents with cannabis use disorder: Baseline and referral data from the INCANT trial. *BMC Psychiatry*, *11*, 110. doi:10.1186/1471-244X-11-110

Rasmussen, P. S., Lindstrom, M. L., Kowalski, K., Filges, T., & Jorgensen, A. M. K. (2012). Protocol: Multidimensional family therapy (MFDT) for young people in treatment for non-opioid drug use. *Campbell Systematic Reviews*. Retrieved from http://campbellcollaboration.org/lib/project/208/

Reeves, B. C., Deeks, J. J., Higgins, J. P. T., & Wells, G. A. (2011). *Including non randomized studies*. Unpublished manuscript.

*Rigter, H., Henderson, C. E., Pelc, I., Tossmann, P., Phan, O., Hendriks, V., . . . Rowe, C. L. (2013). Multidimensional family therapy lowers the rate of cannabis dependence in adolescents: A randomised controlled trial in Western European outpatient settings. *Drug and Alcohol Dependence*, *130*, 85–93.

**Rigter, H., Pelc, I., Phan, O., Tossmann, P., Hendriks, V., Rowe, C., & Schaub, M. (2011). *Report on the INCANT study. Multidimensional family therapy in Europe as a treatment for adolescents with cannabis use disorder and other problem behaviours*. Rotterdam, the Netherlands: Erasmus MC, Department of Public Health. Retrieved from http://incant.eu

Rowe, C. L., & Liddle, H. A. (2006). Treating adolescent substance abuse: State of the science. In H. A. Liddle & C. L. Rowe (Eds.), *Adolescent substance abuse—Research and clinical advances* (pp. 1–21.) New York, NY: Cambridge University Press.

Schaub, M. P., Henderson, C. E., Pelc, I., Tossmann, P., Phan, O., Hendriks, V., . . . Rigter, H. (2014). Multidimensional family therapy decreases the rate of externalising behavioural disorder symptoms in cannabis abusing adolescents: Outcomes of the INCANT trial. *BMC Psychiatry*, *14*, 26.

*Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. *Ann Int Med*, 152. Epub 24 March.

*Shelef, K., Diamond, G. M., Diamond, G. S., & Liddle, H. A. (2005). Adolescent and parent alliance and treatment outcome in multidimensional family therapy. *Journal of Consulting and Clinical Psychology*, *73*, 689–698.

Shelton, K. H., Taylor, P. J., Bonner, A., & van den Bree, M. (2009). Risk factors for homelessness: Evidence from a population-based study. *Psychiatric Services*, *60*, 465–472.

Simmons, R., Ungemack, J., Sussman, J., Anderson, R., Adorno, S., Aguayo, J., . . . Tirnady, R. (2008). Bringing adolescents into substance abuse treatment through community outreach and engagement: The Hartford Youth Project. *Journal of Psychoactive Drugs*, *40*, 41–54.

Sobell, L. C., & Sobell, M. B. (1992). Timeline follow-back: A technique for assessing self reported alcohol consumption. In R. Z. Litten & J. Allen (Eds.), *Measuring alcohol consumption: psychosocial and biological methods* (pp. 41–72). Totowa, NJ: Humana Press.

Stanton, M. D., & Shadish, W. R. (1997). Outcome, attrition, and family–couples treatment for drug abuse: A meta-analysis and review of the controlled, comparative studies. *Psychological Bulletin*, *122*, 170–191.

Stroufe, L. A., & Rutter, M. (1984). The domain of developmental psychopathology. *Child Development*, *55*, 17–29.

Substance Abuse and Mental Health Services Administration. (2010). *Results from the 2009 National Survey on Drug Use and Health, Vol. I. Summary of National Findings* (Office of Applied Studies, NSDUH Series H-38A, HHS Publication No. SMA 10-4586Findings).

Substance Abuse and Mental Health Services Administration. (2011). *Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings*, NSDUH Series H-44, HHS Publication No. SMA 12-4713.

Substance Abuse and Mental Health Services Administration. (2013). National Survey of Substance Abuse Treatment Services (N-SSATS): 2012. Data on Substance Abuse Treatment Facilities. BHSIS Series S-66, HHS Publication No. (SMA) 14-4809. Rockville, MD: Author.

United Nations. (n.d.). *What does the UN mean by "youth," and how does this definition differ from that given to children*. Retrieved May 11, 2015, from http://undesadspd.org/Youth/FAQs.aspx

United Nations Office of Drugs and Crime. (2010). *World drug report 2010*. Vienna, Austria: United Nations Publication.

Vaughn, M. G., & Howard, M. O. (2004). Adolescent substance abuse treatment: A synthesis of controlled evaluations. *Research on Social Work Practice*, *14*, 325–335.

Waldron, H. B. (1997). Adolescent substance and family therapy outcome: A review of randomized trials. *Advances in Clinical Child Psychology*, *4*, 199–234.

Waldron, H. B., & Turner, C. W. (2008). Evidence-based psychosocial treatments for adolescent substance abuse. *Journal of Clinical Child and Adolescent Psychology*, *37*, 238–261.

Waldron, H. B., Turner, C. W., & Ozechowski, T. J. (2006). Profiles of change in behavioural and family interventions for adolescent substance abuse and dependence. In H. A. Liddle & C. L. Rowe (Eds.), *Adolescent substance abuse: Research and clinical advances* (pp. 357–374). New York, NY: Cambridge University Press.

Weller, S. (2006). Situating (young) teenager in geographies of children and youth. *Children's Geographies*, *4*, 97–108.

White, V., & Smith, G. (2009). *Australian secondary school students' use of tobacco, alcohol, and over-the-counter and illicit substances in 2008*. Melbourne, Australia: The Cancer Council Victoria.

Williams, R. J., & Chang, S. Y., & Addiction Centre Adolescent Research Group. (2000). A comprehensive and comparative review of adolescent substance abuse treatment outcome. *Clinical Psychology, Science, and Practice*, *7*, 138–166.

World Health Organization. (2011). *Abuse (drug, alcohol, chemical, substance or psychoactive substance)*. Retrieved from www.who.int/substance_abuse/terminology/abuse/en/index.html