Criminal substance abusing adolescents and systemic treatment

Pol, T.M. van der

CRIMINAL SUBSTANCE ABUSING ADOLESCENTS AND SYSTEMIC TREATMENT

THIMO VAN DER POL

Stellingen behorende bij het proefschrift

Criminal substance abusing adolescents and systemic treatment

Thimo van der Pol

1. Met evidence-based behandelingen voor delinquente, verslaafde adolescenten zijn kan crimineel gedrag aanzienlijk worden teruggedrongen (dit proefschrift).
2. Vergeleken met niet systemische evidence-based therapieën is Multidimensional Family Therapy (MDFT) succesvoller bij adolescenten met gedragsstoornissen en ernstig cannabisgebruik (dit proefschrift).
3. Evidence-based systemische behandelingen delen onderling veel gemeenschappelijke elementen (dit proefschrift).
4. Voor behandelaren is het van wezenlijk belang om continu bewust te zijn van de fase van behandeling waarin het gezin zich bevindt om op het juiste moment een gerichte interventie of therapeutische techniek in te kunnen zetten (dit proefschrift).
5. Het is belangrijk om de psychosociale eigenschappen van een adolescent te matchen met de best passende behandeling (dit proefschrift).
6. Bij adolescenten ziet men vaak dat crimineel gedrag en drugsgebruik elkaar negatief beïnvloeden met vaak kwalijke gevolgen.
7. De (veer)kracht van een (niet goed functionerend) gezin wordt nog vaak onderschat.
8. Het meten en proberen te doorgronden van het concept criminaliteit is zeer complex.
9. Wetenschap in de praktijk heeft een grote toekomst en heeft de potentie om een verbindende rol te spelen in de samenleving.
10. Diversity should not be tolerated, diversity should be celebrated. – Kamasai Washington, 2018 –
11. You need luck to be lucky. - Jean-Pierre Melville, Le cercle rouge, 1970 –
12. For to be free is not merely to cast off one’s chains, but to live in a way that respects and enhances the freedom of others. - Nelson Mandela, 1994 –

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“Wohl bin ich ein Wald und eine Nacht dunkler Bäume: doch wer sich vor meinem Dunkel nicht scheut, der findet auch Rosenhänge unter meinen Zypressen.”

Friedrich Nietzsche, *Also Sprach Zarathustra*

CONTENTS

1

GENERAL INTRODUCTION

BACKGROUND

Adolescents with delinquency and cannabis abuse, which are primarily boys, are predisposed to a variety of comorbid psychiatric psychopathology and form an intricate subgroup which is difficult to treat (Merikangas et al., 2010; Zahn-Waxler, Shirtcliff, & Marceau, 2008). Systemic treatments are considered the type of treatment which renders the most promising results in addressing the complex taxonomy of adolescents' problem behaviours (Carr, 2009; Von Sydow, Retzlaff, Beher, Haun, & Schweitzer, 2013; Waldron & Turner, 2008). Clinicians working with this group of adolescents have to deal, on a daily basis, with serious issues and have to make difficult decisions, impacting the adolescent, his/her family, and society as a whole. For the forensic research field, comprehending and grasping the complexity of these adolescents, which could generate insights and practical advises leading to improvement of care, is a tough and demanding task. This dissertation tries to inform clinical and research practice by providing insight and knowledge concerning: the common elements of systemic treatment, the effectiveness of Multidimensional Family Therapy (MDFT), and the predictive value on treatment outcome of baseline characteristics of the adolescent. This to better understand systemic treatments and to be better able to match a treatment with the individual adolescent's psycho-social make-up.

Adolescents' delinquency

Delinquency represents an immense social and health concern, making it an issue of policy makers, researchers, and people all over the world. The estimated costs for society in western countries reach up to 6.5% of the gross domestic product (GDP) (Miller, Fisher, & Cohen, 2001). The period in life when the incidence of crimes is highest is between the age of 16 and 20. The incidence of crime then decreases with age in adulthood, creating the age crime curve (Hirschi & Gottfredson, 1983). Intervening prior or during this turbulent period of the adolescence life is considered to be crucial.

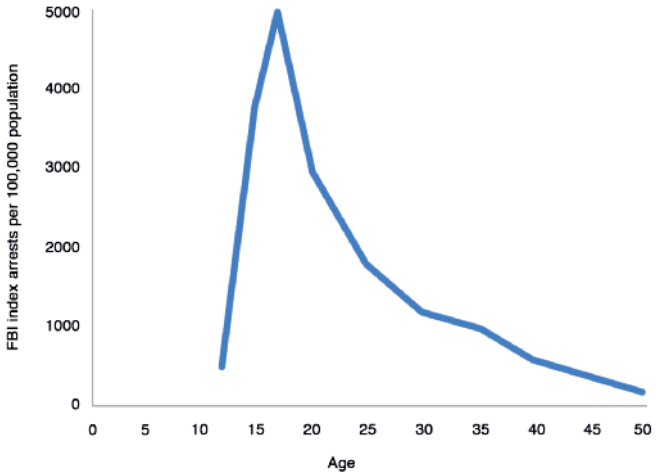

Figure 1. The age crime curve Hirschi & Gottfredson.

In the 1990s two delinquent pathways were distinguished by Moffitt (1993). First, *adolescence-limited* delinquency has its onset during adolescence and desists after transition into adulthood. It occurs in approximately 25% of the general population (mostly boys). Adolescent-limited delinquency is considered to be instigated by the gap between biological and social maturity (the maturity gap) influenced by predominantly environmental factors (e.g. peers, socioeconomic status). Second, *life-course-persistent* delinquency is characterised by a young age of onset of problem behaviour, instigated by a complex interaction of individual and environmental factors (Donker, Smeenk, Laan, & Verhulst, 2003; Moffitt & Caspi, 2001; Moffitt, Caspi, Harrington, & Milne, 2002; Popma & Raine, 2006; Raine, 2013). The life-course-persistent adolescent group (5%, of the adolescent delinquents) demonstrate a pattern of progressively increasing offending, which is very likely to persist into adulthood (Moffitt, 1993). This group of adolescents is considered to be the most problematic for society.

Another theoretical model which emerged in the 1990s is the *developmental-trajectories-model* (Loeber & Hay, 1997). Loeber & Hay described three adolescent developmental trajectories: the *authority-*

conflict-pathway characterised by problems with authority and truancy; the *covert-pathway* beginning with lying and cascading into property offending; and the *overt-pathway* starting with bullying and fighting and developing into serious externalising, violent offending. The aetiology of criminal behaviour differs in each trajectory and adolescents can take different pathways simultaneously. The earlier they start and the more pathways they take, the faster they proceed and the more severe the criminal behaviour is likely to become (Kelley, Loeber, Keenan, & DeLamatre, 1997).

Linked to these models, the *risk-factor-prevention-paradigm* emerged (Farrington, 2000). The basic idea of this paradigm is simple: identify the key risk factors for delinquency and implement prevention methods designed to counter-act them. This paradigm was developed in the medical health care, where it had been used successfully for many years to tackle illnesses such as cancer and heart disease (Hawkins, Catalano, & Miller, 1992). The risk factor prevention paradigm connects the etiology of delinquency with a prevention and treatment focus.

A risk factor is defined as a variable that predicts a high probability of an unwanted outcome. Often, risk factors are dichotomised (Farrington & Loeber, 2000). A protective factor is a variable that interacts with a risk factor to nullify its effect, or alternatively a variable that predicts a low probability of offending among a group at risk. Many researchers have discussed the need to study protective factors in addition to risk factors. For treatment and intervention programmes, it is important to strengthen protective factors and to reduce risk factors to achieve a decrease in criminal behaviour. In fact, Pollard, Hawkins, and Arthur (1999) argued that focusing on protective factors and on building resilience of children was a more positive approach, and more attractive to communities, than solely reducing risk factors, which emphasised deficits and problems. Linked to this idea the Good Lives Model (GLM) emerged (Ward & Brown, 2004; Ward & Gannon, 2006; Ward, Mann, & Gannon, 2007; Ward & Stewart, 2003). This offender rehabilitation model, developed to counter-attack stigmatisation of the delinquents, has a strength-based approach, addressing the delinquents' particular abilities, interests, and aspirations.

It guides practitioners to explicitly construct prevention and intervention plans to accommodate the delinquents to achieve the future perspectives that are personally meaningful for them. The ethical compass of GLM starts with the notion that while offenders have the obligation to respect other peoples' entitlements to well-being, respect and freedom, they are entitled to the same considerations. Two fundamental intervention aims follow from this ethical starting point, the enhancement of the well-being of the delinquent and the risk reduction of future criminal behaviour. The GLM states that these aims are inextricably connected and the best way to create a safer society is to assist delinquents to adopt more fulfilling and socially integrated lifestyles.

To address the risk and/or protective factors of an adolescent the *Risk-Need-Responsivity (RNR)*-model was developed (Andrews, Bonta, & Hoge, 1990; Andrews, Bonta, & Wormith, 2006, 2011). The model is based on three principles. *The Risk principle:* Match the intensity of treatment to the adolescent's risk to re-offend. *The Need principle:* Assess criminogenic needs and target them in treatment. *The Responsivity principle*: Maximise the adolescent's ability to learn from rehabilitative intervention by tailoring the intervention to the strengths, personality, learning style, motivation, abilities and bio-social characteristics of the adolescent.

Numerous risk factors, criminogenic need factors and protective factors have been identified by research (e.g. intelligence: Farington 2016), The risk factors and criminogenic need factors identified by Andrews and Bonta are called the "big eight" (Andrews et al., 2006).

The Big Eight:

1. History of antisocial behaviour characterised by early involvement in a number and variety of antisocial activities and settings. This is considered a strength when absent.
2. Antisocial Personality Pattern, characterised by impulsive, adventurous, pleasure-seeking, and aggressive behaviours, and callous disregard for others. Associated risks consist of weak self-control, anger-management, and problem-solving skills.
3. Antisocial cognition, including attitudes, values, beliefs, and a personal identity favourable to crime.

4. Antisocial associates and relative isolation from prosocial individuals, in which the quality of relationships and the influence that associates have on the individual (e.g., favourable/unfavourable to crime) are important.
5. Problematic circumstances of home (family/ marital)
6. Problematic circumstances at school or work
7. Few if any positive leisure activities
8. Substance abuse

As previously described, the literature contains many attempts to draft a typology of delinquent youth. Lately, most often mentioned (disregarding sexual offenders) is the distinction between violent offenders, non-violent (property) offenders, and versatile offenders who commit both violent and property crimes (Lai, Zeng, & Chu, 2016). For these three classes of adolescent offenders, different profiles of risk factors apply (Colins, Vermeiren, Schuyten, Broekaert, 2009; Lai et al., 2016; Mulder et al., 2012). Adolescents who are considered to be the most impaired are the versatile offenders (Lai et al. 2016).

Adolescents' substance abuse and delinquency

Substance abuse, particularly cannabis abuse in adolescence, is one of the leading risk factors reported in arrests and treatment admissions. Moreover, cannabis use is associated with greater involvement with other substances, conduct problems, antisocial behaviour, and delinquency; and disturbs the natural transition into adulthood (Van den Bree & Pickworth, 2005). Similarly, adolescents are particularly vulnerable to develop substance abuse disorders (Chambers, Taylor, & Potenza, 2003). Because the limbic system in the adolescent brain is still developing, they are susceptible for searching for direct satisfaction and new experiences (Gullo & Dawe, 2008). In combination with the still immature orbitofrontal cortex, responsible for the inhibition of impulses, this increases the likelihood of risk seeking behaviour, such as substance abuse and delinquency (Dahl & Spear, 2004; Gullo & Dawe, 2008). Substance use and adolescent delinquency is found to be strongly interrelated (Dowden & Latimer, 2006; Fergusson, Horwood, & Swain-Campbell, 2002; Loeber & Hay, 1997) and substance abuse is considered a risk factor for

recidivism and persistence of delinquency (Copeland & Swift, 2009; Fallu, Briere, & Janosz, 2014; Lodewijks, De Ruiter, & Doreleijers, 2010). The exact mechanism of the interaction of substance use and delinquency is complicated to grasp. Diverse theoretical models to explain this relationship have been introduced. A tripartite framework explaining the causal route of substance abuse leading to delinquency was developed by Paul Goldstein (1985). The three models described by Goldstein are:

1. The psychopharmacological model

The psychopharmacological model postulates that the effects of substance abuse cause criminal behaviour. For example, intoxication of a person may lead to violent behaviour and even a violent offence. Psychopharmacological delinquent behaviour may involve drug use by the perpetrator, the victim or both. Drug users are more prone to engage in high risk behaviours which increases the likelihood for becoming a victim or a perpetrator.

2. The economic compulsive model

The economic compulsive model or otherwise known as the economic motivation model suggests that drug abusers engage in specific economic driven crimes to support their drug habit. The economic compulsive driven delinquents are motivated by the financial gain. The typical offences are non-violent offences such as burglary and/or shoplifting. Although less likely, there may be violent offences like robberies.

3. The systemic model

the systemic model suggests that the world of drug dealing is inherently violent. This violence refers to the traditionally aggressive patterns of interactions within the system of drug distribution and use. Systemic violent crime typically occurs in areas that have limited social control mechanisms and are economically disadvantaged. Examples of systemic violence include territorial disputes, retribution for failure to pay debts, or elimination of informants.

A more reciprocal approach of the causal connection between substance abuse and delinquency was described by Browning and Loeber (Browning & Loeber, 1999). The model that they developed was called "*the antisocial*

life course model". The antisocial life course model assumes an antisocial lifestyle in which both substance abuse and delinquency are present and share multiple risk factors which influence each other negatively and result in the maintenance of both detrimental behaviours (Browning & Loeber, 1999). The coexistence of a range of associated problem behaviours like drug use, criminal activity, bad school performance, aggression, etc., is often characterised as "*the general deviance syndrome"* (Donovan & Jessor, 1985; Jessor & Jessor, 1977; McGee & Newcomb, 1992). In general, the more problem behaviours youths exhibit in one area (e.g., drug use), the more likely they are to manifest problem behaviours in other areas (Crowley & Riggs, 1995). The antisocial life course model can explain separate, causal and reciprocal pathways to adolescent delinquent behaviour and/or drug abuse. The understanding how the behaviours and/or risk factors of these pathways interact can have implications for treatment choice, which ideally includes consideration of the therapeutic strategy, planning, and modality (Jainchill, Hawke, & Messina, 2005). As a result, it could lead to effective prevention and treatment programmes for adolescents with substance abuse and delinquency (Hall et al., 2016; Merikangas et al., 2010).

Systemic treatments

Several treatments have been developed to effectively reduce delinquency and substance abuse. Various systematic literature reviews and meta-analyses have concluded that family-based treatments and cognitive behavioural therapy are effective in treating adolescents with delinquency, substance abuse, and comorbid psychopathology (Carr, 2009; Von Sydow et al., 2013; Waldron & Turner, 2008).

Systemic treatments emerged in the 1950s, within a variety of settings in the United States and the United Kingdom (Carr, 2012; T. Sexton et al., 2011). The founding principle that united the pioneers of systemic treatments was that human problems are basically interpersonal. Thus, to resolve psychological disorders, an intervention which directly addressed relationships between people was required. This view, driven by research which pointed out the role of family factors in the aetiology of psychiatric disorders and the ineffectiveness of individual treatments, contravened

the prevailing therapeutic attitude that all psychological problems are manifestations of essentially individual disorders.

During the 1970s and 1980s, multiple therapists like Uri Bronfenbrenner, Jay Haley, and Salvador Minuchin boosted the popularity and the implementation rate of family treatment approaches worldwide (Bronfenbrenner, 1979; Haley, 1973; Minuchin, 1974). From the 1990s onwards, family treatments have been further professionalised. Several systemic treatments were developed; Multi Systemic Treatment (MST), Functional Family Therapy (FFT), Multidimensional Family Therapy (MDFT), Multidimensional Treatment Foster Care (MTFC), and Brief Strategic Family Therapy (BSFT), which were implemented in the United States and Europe. The manuals of the systemic treatments described more refined systemic theories, which incorporated strongholds of psychoanalytic, client centred, and cognitive behavioural techniques (e.g., Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009; Liddle, 2015; T. L. Sexton, 2000). One of the systemic treatments that was specifically developed to address both substance abuse and delinquency of the adolescent is Multidimensional Family Therapy (MDFT). Therefore, the main part of this dissertation is focused on investigating MDFT.

MDFT

MDFT is a manualised, evidence-based, intensive intervention programme with assessment and treatment modules focusing on four areas: 1) the individual adolescents' issues regarding substance use disorder (SUD), delinquency, and comorbid psychopathology, 2) the parents' child-rearing skills and personal functioning, 3) communication and relationship between adolescent and parent(s), and 4) interactions between family members and key social systems (Liddle, 2002). MDFT is based on the family therapy foundation established by Minuchin (1974) and Haley, (1976) and on the ecological systems theory of Bronfenbrenner (1979). Within each adolescent's environment there are multiple risk and protective factors that influence and reinforce each other (Brook, Whiteman, & Finch, 1992). Therefore, MDFT was developed to intervene in multiple systems, addressing these risks and strengthening protective factors in the adolescents' environments (Liddle, 1999). MDFT is delivered in two

to three sessions each week over a six months or slightly longer period. Sessions may be held in a variety of places including the home, treatment office, community settings (e.g., school, court), or by phone. The format of MDFT can be modified to suit the treatment needs of the adolescent. MDFT assumes that reductions in negative behaviour of adolescents and increases in positive behaviour occur via multiple pathways, in differing contexts, and through various mechanisms. Knowledge of normal development and developmental psychopathology guides the overall therapeutic strategy and the choice of interventions. MDFT targets core interventions to the adolescent, the parent(s) of the adolescent, the family, and the extra-familial realm. The therapy is organised in three stages. It relies on success in one phase before moving on to the next one. Stage 1 involves "*Building a foundation*", stage 2 "*Working the themes and making behaviour changes*", and stage 3 "*Sealing the changes and exiting*". MDFT is extensively implemented and operational in the United States and Europe and targets youth from diverse ethnic and socioeconomic backgrounds in a variety of settings (Liddle, 2002; Rigter et al., 2010).

DISSERTATION

The general aim of the current dissertation is to identify the common elements of systemic treatments and to examine the effectiveness of Multidimensional Family Treatment (MDFT), for delinquent, substance abusing adolescents with comorbid problem behaviours. Further we aimed to investigate if baseline characteristics of the adolescent differentially influenced treatment effect.

For examining the effectiveness of MDFT and the moderating effect of baseline characteristics of the adolescents a meta-analysis was conducted. Eight randomised controlled trial (RCT) study samples (see table 1) were analysed (Chapter 2). To explore the common elements of systemic treatments we conducted a qualitative study of the evidence-based systemic treatments; Multisystemic Therapy (MST), Functional Family Therapy (FFT), Multidimensional Treatment Foster Care (MTFC), Brief Strategic Family Therapy (BSFT), and MDFT. All the available manuals,

books, and papers, materials describing the content of the treatments were studied to be able to identify the common elements (Chapter 3). To further investigate the effectiveness of MDFT and the moderating effect of baseline characteristics of the adolescents (Chapter 4, 5 and 6), subsets of the INCANT (International Cannabis Need for Treatment) dataset were used to conduct the studies (see table 1). INCANT was a 2 (treatment condition) x 5 (time) repeated measures intent-to-treat randomised effectiveness trial comparing MDFT to individual psychotherapy. Data were gathered at baseline and 3, 6, 9 and 12 months after start of treatment. The countries participating were Belgium, Germany, France, Switzerland and the Netherlands. The total number of adolescent participants in the INCANT study was 450. Study participants were recruited at outpatient secondary level addiction, youth, and forensic care clinics in Brussels, Berlin, Paris, The Hague, and Geneva. Participants were adolescents from 13 through 18 years of age with a recent cannabis use disorder. For the study in chapter 4, the combined datasets of Switzerland and the Netherlands were used (N=169, mean age 16.2, SD 1.2). For the studies in in chapter 5 and 6, the Dutch dataset was used (N=109, mean age 16.8, SD 1.3). Additionally, for the studies in chapter 5 and 6 we retrieved the police arrest records, for the 109 Dutch adolescents, from the National Police Information Services database (IPOL).

OUTLINE

In **chapter 2** we conducted a three-level meta-analysis to explore the effectiveness of MDFT compared to other treatments cognitive behavioural therapy (CBT), group therapies (GT), and combined treatments (CT). We included all studies based on RCT-datasets in the meta-analysis. We analysed the impact of MDFT on the outcome measures: delinquency, substance use, family problems, externalising problems, and internalising problems. Furthermore, we tested the “severity gradient”, assessing whether adolescents with severe problem behaviour (severe substance use, severe externalising psychopathology) were better accommodated with MDFT.

Chapter 3 describes a qualitative study, using a sophisticated identification method (based on the Delphi method), developed by Garland (Garland, Hawley, Brookman-Frazee, & Hurlburt, 2008). We analysed five evidence based systemic treatments for adolescents with disruptive behaviour disorders to identify common elements among these treatments. The treatment which were included in the study were: Multisystemic Therapy (MST), Functional Family Therapy (FFT), Multidimensional Treatment Foster Care (MTFC), Brief Strategic Family Therapy (BSFT), and MDFT. The study disseminated various treatment mechanisms, treatment parameters, and treatment techniques. The identification of common treatment elements between the different treatments, was conducted to be beneficial for the further understanding and development of family-based treatments, training of therapists and research.

Chapter 4 examines 169 Swiss and Dutch cannabis abusing adolescents regarding their criminal behaviour. The Self-Report Delinquency questionnaire (SRD) was used to compare MDFT with Individual Psychotherapy (IP). The SRD was administered at baseline, at 6-month, and at 12-month follow up. In this chapter we analysed total crimes, severity of crimes, and property and violent crimes separately using latent grove curve modeling (LGC).

In **chapter 5** the police arrest data of the 109 Dutch cannabis abusing adolescents was studied, comparing MDFT with CBT. The police arrest data was collected for 6 years, three years prior to the start of treatment until three years after the start of treatment. Crime trajectory analyses were conducted using repeated measure General Linear Models (rmGLM). We investigated total arrests, severity of arrests, arrests for property offences, and arrests for violent offences. Furthermore, we conducted extensive moderator analyses in this study.

In **chapter 6** the follow up period of the arrest data was extended to 7 years to investigate the long-term effects of MDFT and CBT on criminal behaviour for the 109 Dutch substance abusing adolescence. Thus, a crime-trajectory-period of 10 years was studied, to analyse if the substantial decrease of offending achieved during the treatment period, would be retained. Again, crime trajectory analyses were conducted

using repeated measure General Linear Models (rmGLM) to investigated, total arrests, severity of arrests, arrests for property offences, and arrests for violent offences.

Finally, in **chapter 7** a summary and discussion of the results is provided, concluding with practical implications and recommendations for future research and policies.

2

THE EFFECTIVENESS OF MULTIDIMENSIONAL FAMILY THERAPY (MDFT) IN TREATING ADOLESCENTS WITH MULTIPLE BEHAVIOUR PROBLEMS: A META-ANALYSIS

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ABSTRACT

Introduction

Multidimensional Family Therapy (MDFT) is a well-established treatment for adolescents showing both substance abuse and/or antisocial behaviour.

Method

The effectiveness of MDFT in reducing adolescents' substance abuse, delinquency, externalising, and internalising psychopathology, and family malfunctioning was examined by means of a (three-level) meta-analysis, summarising 61 effect sizes from 19 manuscripts (N = 1,488 participants).

Results

Compared with other therapies, the overall effect size of MDFT was significant, albeit small in magnitude (d = 0.24, p < 0.001), and similar across intervention outcome categories. Moderator analysis revealed that adolescents with high severity problems, including severe substance abuse and disruptive behaviour disorder, benefited more from MDFT than adolescents with less severe conditions.

Conclusions

It can be concluded that MDFT is effective for adolescents with substance abuse, delinquency, and comorbid behaviour problems. Subsequently, it is important to match specific characteristics of the adolescents, such as extent of impairment, with MDFT.

INTRODUCTION

Substance abuse disorders (SUD) in adolescents predispose to a variety of behaviour problems, such as delinquency, externalising, and internalising psychopathology, (Grella, Hser, Joshi, & Rounds-Bryant, 2001; Merikangas et al., 2010) and family malfunctioning (Colins et al., 2011; Cuellar, McReynolds, & Wasserman, 2006; Hoeve, McReynolds, & Wasserman, 2013; McReynolds & Wasserman, 2011). The incidence of SUD related comorbidity is estimated to reach up to 75%, (Grella et al., 2001) which influences treatment outcome substantially. For instance, the presence of externalising psychopathology in combination with SUD increases the likelihood of engaging (Anderson, Ramo, Schulte, Cummins, & Brown, 2007; Anderson, Tapert, Moadab, Crowley, & Brown, 2007; Monahan, 2003) and persisting in delinquent behaviour (Lodewijks et al., 2010; Wasserman, McReynolds, Fisher, & Lucas, 2003). The same pattern has been observed in adolescents with internalising psychopathology (Loeber, Stouthamer-Loeber, & Raskin White, 1999). As such, the presence of multiple behaviour problems in adolescence creates major societal and public health concerns (Johnston & Hauser, 2008; Moffit, 1993). Hence, effective prevention and treatment programmes to address the complex problems of adolescents with SUD are direly needed (Hall et al., 2016; Merikangas et al., 2010).

In the last 30 years, several treatments have been developed to effectively reduce SUD, delinquency and comorbid behaviour problems. Various systematic literature reviews and meta-analyses have concluded that family-based treatments and cognitive behavioural therapy are effective in treating adolescents with SUD, delinquency, and comorbid psychopathology (Carr, 2009; Von Sydow et al., 2013; Holly Barrett Waldron & Charles W Turner, 2008). A promising family-based treatment programme is Multidimensional Family Therapy (MDFT) (Liddle, 2002). The present meta-analysis focuses on the effectiveness of MDFT compared to other treatments in reducing adolescents' substance abuse, delinquency, externalising, and internalising psychopathology, and family malfunctioning.

MDFT

MDFT is a manualised, evidence-based, intensive intervention programme with assessment and treatment modules focusing on four areas: 1) the individual adolescent's issues regarding SUD, delinquency, and comorbid psychopathology, 2) the parents' child-rearing skills and personal functioning, 3) communication and relationship between adolescent and parent(s), and 4) interactions between family members and key social systems (Liddle, 2002). MDFT is based on the family therapy foundation established by Minuchin (1974) and Haley, (1976) and on the ecological systems theory of Bronfenbrenner, (1979) which states that human development is shaped by the interaction of the individual with his or her surrounding social contexts. Within each adolescent's environment there are multiple risk and protective factors that influence and reinforce each other (Brook et al., 1992). Therefore, MDFT was developed to intervene in multiple systems, addressing these risk and strengthening protective factors in the adolescents' environments (Liddle, 1999). MDFT is operational and expanding briskly in Europe and in the United States and targets youth from diverse ethnic and socioeconomic backgrounds in a variety of settings (Liddle, 2002; Rigter et al., 2010).

The effectiveness of MDFT

Three previous meta-analyses (Baldwin, Christian, Berkeljon, & Shadish, 2012; Filges, Andersen, & Jørgensen, 2015; Tanner-Smith, Wilson, & Lipsey, 2013) summarised the results of studies that examined the effectiveness of MDFT alone or together with other family-based treatments. Tanner-Smith et al. (2013) concluded that for substance abuse, family therapy is the treatment with the strongest evidence of comparative effectiveness. The overall effect compared with non-family treatments was small (d = 0.26). Similarly, Baldwin et al. (2012) found family therapies to have a small effect for substance abuse and delinquency compared with treatment as usual (d = 0.21) and alternative treatments, such as group therapy, psychodynamic family therapy, individual therapy, parent groups, and family education (d = 0.26). It must be noted that the Baldwin et al. study did not include any follow up data of the studies they reviewed in their meta-analysis. Filges et al. (2015) concluded that MDFT was successful in reducing adolescents' substance abuse in the short run, but not in the long run (no Cohen's d was reported).

The studies included in the meta-analyses revealed substantial variability in the effectiveness of MDFT, which may be explained by differences in study characteristics. For example, differences in MDFT effectiveness could be related to the severity of substance abuse and/or psychopathology of participants. However, the effect of substance abuse severity, psychopathology, and other potentially important moderators were not considered in previous meta-analyses. The authors of the three meta-analyse mentioned not being able to perform extensive moderator analyses due to a limited number of studies. Therefore, further comprehensive research is needed. Insight into moderating factors of the effectiveness of MDFT is important for identifying which adolescents may benefit most from MDFT; this knowledge is crucial for improvement of assessment and referral practices.

The present meta-analysis

The goal of the present study was to provide a meta-analytic overview of the studies examining the effects of MDFT compared to other interventions for adolescents with SUD and comorbid behaviour problems. First, we examined the overall effectiveness of MDFT regarding substance abuse, delinquency, externalising, and internalising psychopathology, and family functioning. Also, the mean effects of MDFT as compared to cognitive behavioural therapy (CBT), group therapy (GT), and combined treatments (CT) were examined. Second, we conducted moderator analyses in order to investigate whether study characteristics contributed to the effectiveness of MDFT. The most important question to be investigated was if adolescents with severe substance abuse and severe externalising psychopathology benefitted more from MDFT than adolescents with less severe conditions, which is from now on called 'the severity gradient'. To test this severity gradient (C.E. Henderson, Dakof, Greenbaum, & Liddle, 2010) a three-level meta-analysis was utilised. This novel three-level analytic method makes it possible to include more effect sizes per study and account for differences between effect sizes both within and between studies, which prevents important data and information loss, increases statistical power and the number of moderators that can be tested (Assink et al., 2015).

METHOD

Sample of studies

Three criteria guided the selection of studies. First, the study had to examine the effectiveness of MDFT. Second, the study had to report results for one or more of the following outcome measures: substance abuse, delinquency, externalising, and internalising psychopathology, and family functioning, or provide enough details to calculate a bivariate test statistic. Third, in view of study quality, a study had to report the results of a randomised controlled trial (RCT).

Candidate studies meeting the selection criteria with data either published by the 29th of February 2016 or available from primary authors (unpublished manuscripts) were collected as follows. First, the electronic databases PubMed, PsycINFO, Embase, and Web of Science were searched for articles, books, chapters, paper presentations, dissertations, and reviews. Our purpose was to find as many studies as possible, and therefore a variety of terms related to Multidimensional Family Therapy (MDFT) were used. Search terms, such as multidimensional*, famil*, and MDFT, were cross-referenced with therap*, and treat* in English, Dutch, French and German: ((Multidimensional Family Therap*) OR (Multidimensional Family Treat*) OR (MDFT AND (Family OR Therapy OR Multidimensional)). Subsequently, manual searches of references, lists from these publications were conducted to identify relevant studies not found in the electronic databases.

If multiple publications were found that reported on the same study, we only included manuscripts which reported a different outcome measure or a subsample of the original study. Furthermore, we contacted the authors of the publications to check for unpublished materials. Seven manuscripts were received of which one submitted paper (Liddle, 2015) and 4 reports (Grichting, Haug, Nielsen, & Schaub, 2011; Phan, 2011; Tossmann & Jonas, 2010; Verbanck et al., 2010) were eligible to be included in the meta-analysis. In total 210 manuscripts were found, of which we selected 71 on the basis of information in the abstract. After assessing the 71 articles, 19 manuscripts on effects of MDFT met our

criteria and were included in the present meta-analysis. For the purpose of standardisation of the effect sizes and the possibility to examine the influence of severe behaviour problems through moderator analyses, we asked the authors of the manuscripts for supplementary information on substance abuse and psychopathology. The 19 manuscripts together with the retrieved supplementary information yielded 61 effect sizes, resulting from 8 independent studies with a total of 1,488 subjects. Figure 1 presents a flowchart of the selection procedure.

File drawer problem

The tendency of journals to exclude manuscripts reporting non-significant findings, referred to as publication bias, may have implications for the final conclusions of the meta-analysis (Rosenthal, 1991; Van IJzendoorn, 1998). For this, Rosenthal coined the term 'file drawer problem' (1979). Several methods exist to address potential effects of publication bias, but each has its own shortcomings (Rothstein, 2008). The best solution in preventing effects of publication bias is to make extensive efforts to obtain all unpublished materials (Mullen, 2013; Rosenthal, 1991). Following the advice of Rothstein, (2008) three methods addressing publication bias were applied. First, we calculated a fail-safe number, which estimates the number of unretrieved studies reporting null results needed to bring the overall combined effect size to a level at which it would no longer be statistically significant (Rosenthal, 1991). The fail-safe number, 2,554, exceeded Rosenthal's (1995) critical value ($61 * 5 + 10 = 315$). This indicates that the number of unpublished studies with non-significant results that would be required to reduce significant results to non-significant results was sufficient, suggesting no evidence for publication bias.

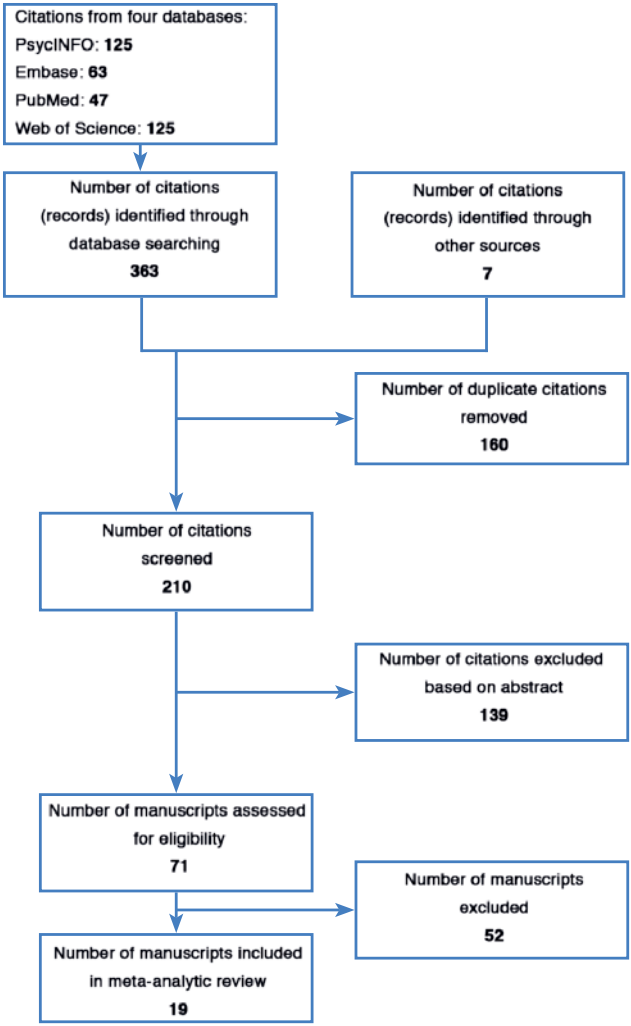


Figure 1. Flowchart of literature search and screening.

A second method of examining publication bias is inspecting the distribution of each individual study's effect size on the horizontal axis

against its sample size and standard error or precision (the reciprocal of the standard error) on the vertical axis. The distribution of effect sizes should form a funnel shape if no publication bias is present, as studies with small sample sizes are expected to show a larger variation in effect size magnitude, whereas studies with large effect sizes are expected to result in effect sizes closer to the overall mean. A violation of funnel plot symmetry reflects publication bias, that is, a selective inclusion of studies showing positive or negative outcomes (Sutton, Duval, Tweedie, Abrams, & Jones, 2000). Figure 2 depicts the funnel plot of effect sizes. In the present study, funnel plot asymmetry was tested by regressing the standard normal deviate, defined as the effect size, divided by its standard error, against the estimate's precision (the inverse of the standard error), which largely depends on sample size (Egger, Smith, Schneider, & Minder, 1997). If there is asymmetry, the regression line does not run through the origin and the intercept significantly deviates from zero. The intercept did not significantly deviate from zero ($z = 1.490$, $p = 0.136$), indicating no publication bias.

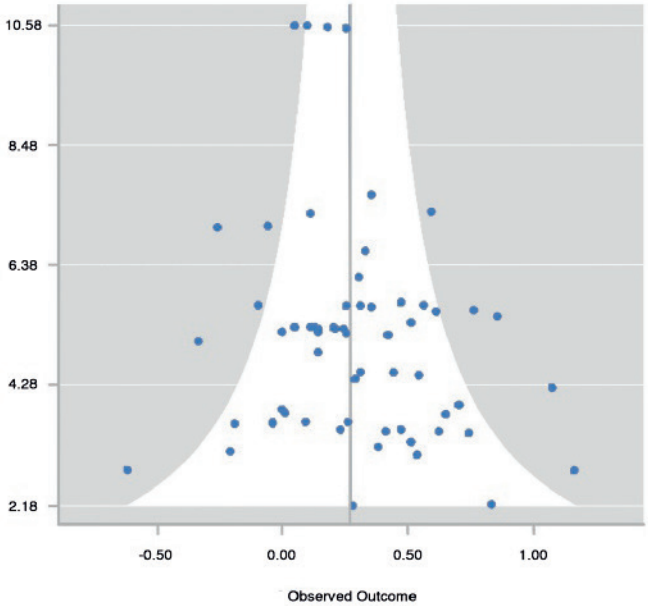


Figure 2. Funnel plot of effect sizes.

Third, we utilised the *P*-curve method, which was recently introduced by Simonsohn et al. (2014). The rationale of the method is that if a set of statistically significant studies contains real evidential value in favour of rejecting a joint null hypothesis, *p*-values extracted from these studies should display a larger share of *p*-values closer to zero as compared to *p*-values in the upper ranges just below the critical value ($p < 0.05$) of statistical significance. Likewise, if there are signs of *p*-hacking, that is, if a non-significant *p*-value is pushed past the critical value for statistical significance, a larger share of the *p*-values should be observed just below the threshold of statistical significance rather than closer to zero. The *P*-curve analyses whether MDFT is being more or less effective than the compared therapies. The *P*-curve test was performed on all of the statistically significant two-tailed *p*-values in our sample. When testing the two-tailed *p*-values the right-skew *p*-value was <0.0001, (Figure 3). The *P*-curve showed statistically significant signs of evidential value and the statistical power estimated was 85%. It can be concluded that the results indicate no evidence of *p*-hacking.

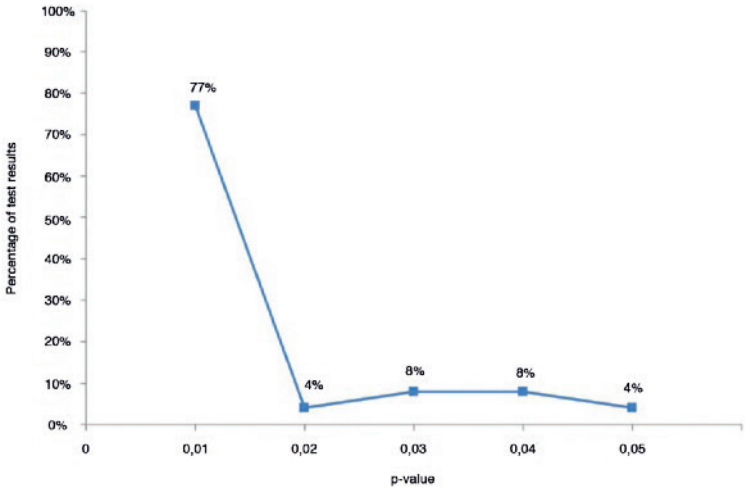


Figure 3. P-curve, testing possible p-hacking.

Note. The Observed p-curve includes 26 statistically significant ($p<0.05$) results, of which 22 are $p<0.025$. There were no non-significant results entered.

Coding of the study outcomes and characteristics

We retrieved the study results (test statistic and value) or data to calculate the effect size from the manuscripts. Next, information on sample descriptors, treatment descriptors, research design, and manuscript characteristics were collected.

For the sample descriptors, we categorised the effect sizes into five primary outcome measures: substance abuse, delinquency, externalising, and internalising psychopathology, and family functioning. We coded the geographical location where the study had been conducted (Europe, United States). As for demographic characteristics, we collected data on age, gender, socioeconomic status (SES), and ethnicity. We coded age of the subjects at the start of treatment. Gender was defined as percentage of males in the sample. The SES was characterised by calculating the mean family income in euros. Furthermore, we defined the percentage of Caucasian, Afro-American, Hispanic, Asian, and other ethnicities (e.g., Caribbean, North-African). The percentage of adolescents in the sample with additional psychiatric disorders was also coded for: conduct disorder, oppositional defiant disorder, and disruptive behaviour disorder (DBD) (i.e., the presence of either CD and/or ODD), attention deficit hyperactivity disorder (ADHD), generalised anxiety disorder (GAD), and depression. Moreover, we collected data on the type of substance abuse and calculated the percentage of cannabis, alcohol, and other drug use in the sample. Finally, we retrieved information on the severity of cannabis use. Using the benchmark established by Hendriks et al. (2011) and also used in Rigter et al., (2013) we retrieved the percentage of adolescents who reported using substances more than 64 of the 90 day intake assessment period.

For the treatment descriptors, we distinguished three treatment comparison groups: cognitive behavioural therapy (CBT), group therapy (GT), and combined treatments (CT). We assigned the comparison group in the Rigter et al. (2013) overarching multi-site trial to the CBT category, because in all sites the comparison group consisted of either CBT alone or CBT complemented with other treatment approaches. CT was coded if more than one treatment module was combined. The following

combinations were found: CBT and motivational enhancement therapy sessions (Dennis et al., 2004), CBT with GT and family interventions (The Adolescent Community Reinforcement Approach, ACRA; Dennis et al., 2004), CBT, motivation enhancement therapy sessions, and family interventions (Family Support Network, FSN; Dennis et al., 2004), and CBT and GT (Residential Substance Abuse Treatment, RST; Liddle, 2015). Finally, treatment duration was collected.

For the research design characteristics, we coded whether studies were conducted by the developers of the treatment or by others (developers, non-developers), to test the assumption that studies carried out by the developers yield higher effect sizes. In this category, overall sample size, treatment group size, comparison group size, and study follow-up duration were analysed as well. For the manuscript characteristics, we coded the year of publication. If the manuscript had not been published, we used the year that the manuscript was written. Finally, the impact factor of the journal in which the manuscript was published was inventoried.

Inter-rater reliability

The first and third author coded the effect sizes and study characteristics. Reliability of the coding scheme was examined by having a subset of the study characteristics coded by two research assistants. Ten manuscripts were randomly selected. Inter-rater agreement was analysed for each of the study outcomes and study characteristics by calculating the percentage of agreement for all study characteristics, Kappa for categorical variables and intraclass correlation for interval and ratio variables. The inter-rater reliability was good, with Kappa's ranging from 0.93 (93% agreement) for comparison group to 1.00 for outcome, geographic location and independence of researchers (100% agreement); intraclass correlations ranged from 0.96 for follow up period (91% agreement) to 1.00 for effect size (91% agreement), SES (91% agreement), average age (100% agreement), and percentage of males (100% agreement).

Analyses

For each study outcome, a Cohen's *d* effect size was coded or calculated. When not provided, formulae provided by Lipsey and Wilson (2001) to transform test statistics into Cohen's *d* or to calculate *d* on the basis of

means and standard deviations, were used. Effect sizes of d = 0.20, d = 0.50 and d = 0.80 were considered as small, medium and large group differences respectively, whereas d = 0.00 would indicate no difference between the experimental and comparison groups (Cohen, 1988). Using standardized z-values larger than 3.29 or smaller than -3.29, (Tabachnick & Fidell, 1989) no outliers were identified. Each continuous moderator variable was centred around its mean. For the categorical variables we made dichotomous dummy variables. The extent of the variation in effect sizes was examined by conducting a test for homogeneity of effect sizes.

Independence of study results is desirable when conducting a meta-analysis in order to prevent a particular study being weighted more strongly than others (Lipsey & Wilson, 2001; Mullen, 2013; Rosenthal, 1991). To deal with dependency of study results, we applied a three-level random effects model (Cheung, 2014; Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013). This model accounts for three sources of variance: sampling variance (level 1 variance), variance between effect sizes from the same study (level 2 variance), and variance between studies (level 3 variance (Hox, 2002; Van den Noortgate et al., 2013)). A three-level random effects model therefore accounts for the hierarchical structure of the data in which the effect sizes or study results (the lowest level) are nested within studies (the highest level). A likelihood ratio test was used to examine between-study and within-study heterogeneity (Raudenbush & Bryk, 2002).

Moderator analyses were conducted by extending the model with study and effect size characteristics. For these models including moderators, an omnibus test of the fixed-model parameters was conducted, which tests the null hypothesis that the group mean effect sizes are equal. The Knapp and Hartung (2003) adjustment was applied to control for Type I error rates. We used the metafor package (Viechtbauer, 2010) for the R environment (Version 3.2.3; R Development Core Team, 2015) for modelling a three-level random effects model as described by Van den Noortgate et al. (2013). Parameters were estimated using the restricted maximum likelihood procedure.

RESULTS

The 19 manuscripts included in the meta-analysis reported on 8 studies and presented 61 effect sizes. These studies examined 1,488 adolescents in total, of whom 699 received MDFT, and 789 cognitive behavioural therapy (CBT), group therapy (GT), or combined treatments (CT). The effect sizes from the individual studies ranged from d = -0.62 to 1.16. An overview of the characteristics of the 19 manuscripts and the 61 effect sizes is presented in Table 1.

Results indicated that the overall mean effect size for MDFT was beneficial compared to adolescents receiving another form of therapy, $d = 0.24$, $p < 0.01$. For effect sizes, variance between effect sizes within studies (level 2 variance), $\sigma^2 = 0.012$, $\chi^2(1) = 23.00$, $p = 0.14$, was nonsignificant, whereas variation between studies (level 3 variance), $\sigma^2 = 0.048$, $\chi^2(1) = 32.77$, $p < 0.001$ was significant resulting in the examination of the extent to which potential moderators explained effect size variability.

Table 1. Description of Major Characteristics of Studies Used in the Meta-analysis.

no.	study	year	N	N target	N control	comparison condition	study ID	age mean	follow up	% males	% minorities	% conduct disorder	% severe cannabis users	outcome measure	effect size
1	Dakof et al.	2015	112	55	57	Group	1	16.00	18	88	100	52	48	substance abuse	0.05
2	-	2015	54	24	30	Group	1	16.26	18	-	100	-	100	substance abuse	0.09
3	-	2015	58	31	27	Group	1	15.90	18	-	100	-	0	substance abuse	0.01
4	-	2015	112	55	57	Group	1	16.00	18	88	100	52	48	delinquency	0.14
5	-	2015	112	55	57	Group	1	16.00	18	88	100	52	48	externalising	0.21
6	-	2015	112	55	57	Group	1	16.00	18	88	100	52	48	internalising	0.24
7	Liddle et al.	draft	113	57	56	CT	2	15.36	12	75	88	77	70	substance abuse	0.05
8	-	draft	79	43	36	CT	2	15.33	12	-	-	-	100	substance abuse	0.29
9	-	draft	34	14	20	CT	2	15.44	12	-	-	-	0	substance abuse	-0.62
10	-	draft	113	57	56	CT	2	15.36	12	75	88	77	70	delinquency	0.13
11	-	draft	113	57	56	CT	2	15.36	12	75	88	77	70	externalising	0.20
12	-	draft	113	57	56	CT	2	15.36	12	75	88	77	70	internalising	0.11
13	Schaub et al.	2014	450	212	238	CBT	3	16.30	6	85	40	-	48	externalising	0.05
14	-	2014	450	212	238	CBT	3	16.30	6	85	40	-	48	internalising	0.10

no.	study	year	N	N target	N control	comparison condition	study ID	age mean	follow up	% males	% minorities	% conduct disorder	% severe cannabis users	outcome measure	effect size
15	-	2014	450	212	238	CBT	3	16.30	6	85	40	-	48	family	0.18
16	Rigter et al.	2013	450	212	238	CBT	3	16.30	6	85	40	-	48	substance abuse	0.25
17	-	2013	237	108	129	CBT	3	16.39	6	-	-	-	100	substance abuse	0.35
18	-	2013	213	104	109	CBT	3	16.09	6	-	-	-	0	substance abuse	0.11
19	Hendriks et al.	2012	109	55	54	CBT	3	16.80	6	80	28	29	51	externalising	0.25
20	-	2012	109	55	54	CBT	3	16.80	6	80	28	29	51	internalising	0.42
21	Hendriks et al.	2011	109	55	54	CBT	3	16.80	6	80	28	29	51	substance abuse	0.14
22	-	2011	50	28	22	CBT	3	17.03	6	-	-	29	100	substance abuse	0.41
23	-	2011	53	24	29	CBT	3	17.03	6	-	-	29	0	substance abuse	-0.04
24	-	2011	37	21	16	CBT	3	16.80	6	-	-	84	57	substance abuse	1.16
25	-	2011	109	55	54	CBT	3	16.80	6	80	28	29	51	delinquency	0.00
26	Liddle et al.	2011	154	76	78	CT	4	15.40	3	83	84	43	33	delinquency	0.30
27	Phan	2011	101	38	63	CT	3	16.29	6	89	33	-	57	substance abuse	0.14

no.	study	year	N	N target	N control	comparison condition	study ID	age mean	follow up	% males	% minorities	% conduct disorder	% severe cannabis users	outcome measure	effect size
28	-	2011	58	20	38	CT	3	16.48	6	89	33	-	100	substance abuse	-0.19
29	-	2011	43	18	25	CT	3	16.02	6	89	33	-	0	substance abuse	0.38
30	Grichting	2011	60	30	30	CT	3	16.07	6	92	67	-	33	substance abuse	0.00
31	-	2011	20	8	12	CT	3	16.15	6	92	67	-	100	substance abuse	0.28
32	-	2011	40	22	18	CT	3	16.03	6	92	67	-	0	substance abuse	-0.21
33	Tossmann	2010	120	59	61	CT	3	16.21	6	83	30	-	55	substance abuse	0.51
34	-	2010	66	33	33	CT	3	16.42	6	83	30	-	100	substance abuse	0.70
35	-	2010	54	26	28	CT	3	15.96	6	83	30	-	0	substance abuse	0.26
36	Verbanck	2010	60	30	30	CBT	3	16.60	6	93	37	-	65	substance abuse	0.65
37	-	2010	39	19	20	CBT	3	16.67	6	93	37	-	100	substance abuse	0.53
38	-	2010	21	11	10	CBT	3	16.48	6	93	37	-	0	substance abuse	0.83

no.	study	year	N	N target	N control	comparison condition	study ID	age mean	follow up	% males	% minorities	% conduct disorder	% severe cannabis users	outcome measure	effect size
39	Henderson et al. I	2010	45	22	23	CBT	5	15.53	12	-	-	-	100	substance abuse	0.51
40	-	2010	178	90	88	CBT	5	15.36	12	81	-	-	0	substance abuse	0.33
41	Henderson et al. II	2010	50	25	25	CT	4	15.52	3	-	-	-	100	substance abuse	0.23
42	-	2010	104	51	53	CT	4	15.36	3	-	-	-	0	substance abuse	-0.34
43	Henderson et al.	2009	83	40	43	Group	6	13.73	6	74	84	39	2	family	0.44
44	Liddle et al.	2009	83	40	43	Group	6	13.73	6	74	97	39	2	substance abuse	1.07
45	-	2009	83	40	43	Group	6	13.73	6	74	97	39	2	delinquency	0.31
46	-	2009	83	40	43	Group	6	13.73	6	74	97	39	2	internalising	0.54
47	Liddle et al.	2008	224	112	112	CBT	5	15.40	12	81	97	50	21	substance abuse	0.59
48	Hogue et al.	2008	136	74	62	CBT	5	15.50	6	81	80	50	-	substance abuse	0.47
49	-	2008	136	74	62	CBT	5	15.50	6	81	80	50	-	externalising	0.56
50	-	2008	136	74	62	CBT	5	15.50	6	81	80	50	-	internalising	0.76
51	Hogue et al.	2004	51	25	26	CBT	5	15.20	12	67	75	69	-	substance abuse	0.47

no.	study	year	N	N target	N control	comparison condition	study ID	age mean	follow up	% males	% minorities	% conduct disorder	% severe cannabis users	outcome measure	effect size
52	-	2004	51	25	26	CBT	5	15.20	12	67	75	69	-	externalising	0.62
53	-	2004	51	25	26	CBT	5	15.20	12	67	75	69	-	internalising	0.74
54	Dennis et al. I	2004	200	100	100	CT	7	16.00	9	83	39	53	-	substance abuse	-0.06
55	Dennis et al. II	2004	200	100	100	CT	7	16.00	9	83	39	53	-	substance abuse	-0.26
56	Liddle et al. I	2001	152	47	105	Group	8	15.90	12	80	49	-	1	substance abuse	0.25
57	-	2001	152	47	105	Group	8	15.90	12	80	49	-	1	externalising	-0.10
58	-	2001	152	47	105	Group	8	15.90	12	80	49	-	1	family	0.61
59	Liddle et al. II	2001	152	47	105	CT	8	15.90	12	80	49	-	1	substance abuse	0.85
60	-	2001	152	47	105	CT	8	15.90	12	80	49	-	1	externalising	0.35
61	-	2001	152	47	105	CT	8	15.90	12	80	49	-	1	family	0.31

Note. CBT = Cognitive Behavioural Therapy, CT = Combined Treatment, Group = Group Therapy.

Moderator analyses

Table 2 summarises the results of the moderator analyses. Two moderators yielded a positive contribution to effect size. Percentage of severe substance abusers in the study sample was associated with larger effects favouring MDFT, $F(1,45) = 6.150$, $p = 0.017$. This suggests that adolescents with more severe substance abuse benefit more from MDFT than from the comparison treatments. In addition, percentage of DBD was positively related to the effect size, $F(1,5) = 14.072$, $p = 0.013$, indicating that samples with higher percentages of DBD responded better to MDFT. Year of publication yielded a trend, $F(1,59) = 3.638$, $p = 0.061$, showing relatively smaller effects in newer studies.

The effect sizes for the outcome measures substance abuse, delinquency, externalising, and internalising psychopathology, and family functioning, were found to be in the same range, all indicating a small incremental effect over other established treatments with no significant differences between the effect sizes for the five outcome categories. Furthermore, for treatment groups, no significant differences in effect size were found between studies that compared MDFT with CBT and studies that compared MDFT with CT, respectively GT. The geographic location where studies were conducted (i.e., Europe versus United States) had no impact on study results. Studies led by the developers of MDFT had similar outcomes as those led by independent researchers. No moderating effects were found for adolescents' age, gender, SES, ethnic background, duration of therapy, and duration of the follow-up period. Moreover, the rates of depression, GAD, ADHD, CD, and ODD in the sample, and percentage of cannabis, alcohol, and other drugs were not associated with effect size. Finally, study sample sizes and impact factor had no moderating effect.

Table 2. Results for Moderators.

Moderator variables	# Studies	# ES	β0, mean d a (95% CI)	β1 (95% CI)	Omnibus test	Variance level 2b	Variance level 3c
Sample descriptors							
Outcome characteristics					F(4,56) = 0.383	0.015	0.049***
substance abuse (rc)	8	37	0.252 (0.069; 0.436)**				
delinquency	5	5	0.212 (-0.049; 0.473)	0.041 (-0.273; 0.192)			
externalising	5	8	0.168 (-0.058; 0.393)	0.085 (-0.261; 0.092)			
internalising	5	7	0.297 (0.063; 0.531)*	0.044 (-0.143; 0.232)			
family functioning	3	4	0.252 (-0.015; 0.520)	0.000 (-0.230; 0.230)			
Geographic location					F(1,59) = 0.003	0.011	0.061***
United States (rc)	7	36	0.226 (-0.277; 0.728)				
Europe	1	25	0.240 (0.037; 0.443)*	0.015 (-0.527; 0.557)			
Independence researchers					F(1,59) = 0.003	0.011	0.061***
yes (rc)	5	38	0.226 (-0.277; 0.728)				
no	6	23	0.240 (0.037; 0.443)*	0.015 (-0.527; 0.557)			
Age of the subjects	8	61	0.224 (0.052; 0.397)*	0.058 (-0.240; 0.123)	F(1,59) = 0.521	0.012	0.045***
Socioeconomic status (SES)	5	23	0.410 (0.212; 0.609)***	0.000 (-0.000; 0.000)	F(1,21) = 0.626	0.018	0.029***
% Males	8	52	0.262 (0.102; 0.423)**	0.856 (-2.501; 0.789)	F(1,50) = 1.093	0.011	0.039***
% Caucasians	8	54	0.281 (0.080; 0.481)**	0.145 (-0.469; 0.759)	F(1,52) = 0.225	0.008	0.062***
% African-Americans	8	42	0.243 (0.076; 0.411)**	0.429 (-0.299; 1.158)	F(1,40) = 1.419	0.005	0.042***

Moderator variables	# Studies	# ES	β0, mean d a (95% CI)	β1 (95% CI)	Omnibus test	Variance level 2b	Variance level 3c
% Hispanics	8	42	0.262 (0.071; 0.454)**	0.040 (-0.709; 0.790)	F(1,40) = 0.012	0.005	0.058***
% Asians	8	49	0.232 (0.048; 0.416)*	2.676 (-6.430; 11.782)	F(1,47) = 0.349	0.008	0.058***
% Others	8	43	0.226 (0.045; 0.408)*	0.585 (-1.812; 0.641)	F(1,41) = 0.929	0.009	0.053***
% Cultural minority	8	40	0.256 (0.075; 0.437)**	0.139 (-0.555; 0.834)	F(1,38) = 0.165	0.006	0.051***
% CD	7	29	0.272 (0.018; 0.525)*	0.736 (-0.234; 1.705)	F(1,27) = 2.421	0.000	0.096***
% ODD	3	18	0.349 (0.082; 0.616)*	0.271 (-0.879; 1.421)	F(1,16) = 0.250	0.000	0.040
% DBD	2	7	0.494 (0.317; 0.670)***	1.371 (0.432; 2.311)*	F(1,5) = 14.072	0.000	0.000
% ADHD	5	15	0.199 (-0.088; 0.487)	1.118 (-5.008; 2.773)	F(1,13) = 0.385	0.000	0.075**
% GAD	4	14	0.223 (-0.202; 0.648)	0.051 (-3.533; 3.430)	F(1,12) = 0.001	0.000	0.125***
% Depression	6	22	0.273 (-0.008; 0.553)	0.320 (-3.111; 3.751)	F(1,20) = 0.038	0.000	0.090***
% Cannabis	7	54	0.221 (0.040; 0.402)*	0.236 (-0.993; 0.521)	F(1,52) = 0.393	0.005	0.047***
% Alcohol	5	18	0.210 (-0.075; 0.472)	0.490 (-1.899; 0.919)	F(1,16) = 0.543	0.000	0.079***
% Other drugs	5	18	0.200 (-0.108; 0.508)	0.413 (-3.727; 2.902)	F(1,16) = 0.070	0.000	0.092***
% Severe substance abuse	7	47	0.282 (0.067; 0.496)*	0.264 (0.050; 0.479)*	F(1,45) = 6.150	0.001	0.059**
Treatment descriptors							
Comparison condition					F(2,58) = 0.218	0.012	0.060***
Cognitive behavioural therapy (CBT)	2	32	0.281 (0.034; 0.529)*				
Combined treatment (CT) (rc)	4	16	0.257 (0.044; 0.469)	0.025 (-0.222; 0.172)			
Group therapy (GT)	3	13	0.178 (-0.087; 0.444)	0.103 (-0.420; 0.214)			

Moderator variables	# Studies	# ES	β0, mean d a (95% CI)	β1 (95% CI)	Omnibus test	Variance level 2b	Variance level 3c
Duration of treatment in months	8	61	0.263 (0.102; 0.423)**	0.059 (-0.035; 0.154)	F(1,59) = 1.579	0.011	0.039***
Research design							
Total sample size	8	61	0.246 (0.077; 0.416)**	0.000 (-0.001; 0.000)	F(1,59) = 2.448	0.009	0.048***
Sample size treatment group	8	61	0.247 (0.079; 0.414)**	0.001 (-0.002; 0.000)	F(1,59) = 2.374	0.009	0.047***
Sample size comparison group	8	61	0.246 (0.076; 0.417)**	0.001 (-0.002; 0.000)	F(1,59) = 2.491	0.009	0.049***
Follow-up (in months)	8	46	0.237 (0.053; 0.422)*	0.012 (-0.043; 0.019)	F(1,44) = 0.573	0.010	0.057***
Manuscript characteristics							
Year of publication	8	61	0.213 (0.015; 0.410)*	0.031 (-0.063; 0.001)	F(1,59) = 3.638	0.006	0.068***
Impact factor	8	61	0.240 (0.062; 0.417)**	0.006 (-0.048; 0.036)	F(1,59) = 0.084	0.012	0.053***

Note. # studies = number of independent studies; # ES = number of effect sizes; mean d = mean effect size; CI = confidence interval; rc = reference category.

[a] For continuous predictors, the mean effect size indicates the mean effect size of a participant with an average value on the corresponding predictor.

[b] Variance between the effect sizes from the same study.

[c] Variance between studies.

$^{+}$ $p < 0.1$ * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

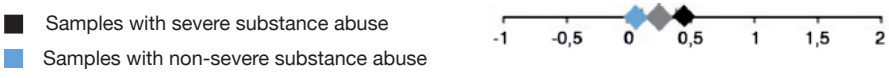
Model with multiple moderators

To examine the unique contribution of each moderator to the variance in effect size, a model with multiple moderators was tested. Variables associated with effect sizes with a $p < 0.20$ in the bivariate moderator analyses reported above were entered in the model. To retain sufficient power in the model with multiple moderators, only the variables for which the number of effect sizes was at least $k = 30$ were included. The following variables were included: percentage of adolescents with severe substance abuse, sample size, and year of publication. The model was found to be significant, $F(3,43) = 5.779$, $p = 0.002$, $k = 47$. Two moderators were significant predictors of effect size: severe substance abuse, $\beta = 0.26$, $p = 0.016$, and year of publication, $\beta = -0.09$, $p = 0.002$. Thus, studies with a larger proportion of subjects with severe substance abuse and older studies yielded larger effect sizes, favouring MDFT. To illustrate the effect of severe substance abuse in samples, Table 3 (Neyeloff, Fuchs, & Moreira, 2012) includes a forest plot that depicts studies with low (0%), moderate (1-99%), and high (100%) severe substance abusers. The forest plot illustrates that in general, MDFT generated larger effect sizes for samples with a higher percentage of severe cannabis users. The computed mean effect sizes for relatively low, moderate, and high severe substance abusers showed that effects of MDFT were non-significant for non-severe substance abusers ($d = 0.09$), small for moderate abusers ($d = 0.28$) and small to moderate for severe substance abusers ($d = 0.38$).

Table 3. Foster plot of individual effect sizes 95% confidence intervals.

No.	Study	Year	Effect Size	95% CI		Forest Plot
1	Dakof et al.	2015	0.05	-0.32	0.42	
2	-	2015	0.09	-0.28	0.46	
3	-	2015	0.01	-0.36	0.38	
4	-	2015	0.14	-0.31	0.59	
5	-	2015	0.21	-0.50	0.92	
6	-	2015	0.24	-0.13	0.61	
7	Liddle et al.	draft	0.05	-0.03	0.13	
8	-	draft	0.29	-0.08	0.66	
9	-	draft	-0.62	-0.99	-0.25	
10	-	draft	0.13	0.05	0.21	
11	-	draft	0.20	0.12	0.28	
12	-	draft	0.11	-0.26	0.48	
13	Schaub et al.	2014	0.05	-0.85	0.95	
14	-	2014	0.10	-0.55	0.75	
15	-	2014	0.18	-0.33	0.69	
16	Rigter et al.	2013	0.25	0.07	0.43	
17	-	2013	0.35	0.17	0.53	
18	-	2013	0.11	-0.07	0.29	
19	Hendriks et al.	2012	0.25	0.07	0.43	
20	-	2012	0.42	0.17	0.67	
21	Hendriks et al.	2011	0.14	-0.13	0.41	
22	-	2011	0.41	0.04	0.78	
23	-	2011	-0.04	-0.41	0.33	
24	-	2011	1.16	0.79	1.53	
25	-	2011	0.00	-0.37	0.37	
26	Liddle et al.	2011	0.30	-0.27	0.87	
27	Phan	2011	0.14	-0.23	0.51	
28	-	2011	-0.19	-0.68	0.30	
29	-	2011	0.38	-0.15	0.91	
30	Grichting	2011	0.00	-0.53	0.53	
31	-	2011	0.28	-0.23	0.79	
32	-	2011	-0.21	-0.58	0.16	
33	Tossmann	2010	0.51	0.00	1.02	

No.	Study	Year	Effect Size	95% CI		Forest Plot
34	-	2010	0.70	-0.20	1.60	
35	-	2010	0.26	-0.37	0.89	
36	Verbanck	2010	0.65	0.24	1.06	
37	-	2010	0.53	-0.02	1.08	
38	-	2010	0.83	0.22	1.44	
39	Henderson et al. I	2010	0.51	-0.06	1.08	
40	-	2010	0.33	-0.22	0.88	
41	Henderson et al. II	2010	0.23	-0.36	0.82	
42	-	2010	-0.34	-0.63	-0.05	
43	Henderson et al.	2009	0.44	-0.01	0.89	
44	Liddle et al.	2009	1.07	0.72	1.42	
45	-	2009	0.31	0.04	0.58	
46	-	2009	0.54	0.27	0.81	
47	Liddle et al.	2008	0.59	0.16	1.02	
48	Hogue et al.	2008	0.47	0.04	0.90	
49	-	2008	0.56	0.13	0.99	
50	-	2008	0.76	0.49	1.03	
51	Hogue et al.	2004	0.47	0.14	0.80	
52	-	2004	0.62	0.27	0.97	
53	-	2004	0.74	0.39	1.09	
54	Dennis et al. I	2004	-0.06	-0.41	0.29	
55	Dennis et al. II	2004	-0.26	-0.61	0.09	
56	Liddle et al. I	2001	0.25	-0.10	0.60	
57	-	2001	-0.10	-0.45	0.25	
58	-	2001	0.61	0.26	0.96	
59	Liddle et al. II	2001	0.85	0.28	1.42	
60	-	2001	0.35	-0.36	1.06	
61	-	2001	0.31	-0.24	0.86	



DISCUSSION

The purpose of this meta-analysis was first to examine the effectiveness of MDFT, compared to other (active) treatments, and second to inventory the effects of severe behaviour problems and other potential moderators. Overall, compared to other treatments and across outcome categories, MDFT showed a significant effect size, d = 0.24, which corresponds to a success rate difference (SRD), (Kraemer & Kupfer, 2006) of approximately 13%. These findings supporting the effectiveness of MDFT are in line with the meta-analyses of other multiple-systems-based treatment, such as multisystemic therapy (MST) (Van der Stouwe, Asscher, Stams, Deković, & Van der Laan, 2014). In addition, MDFT was found to be most effective in adolescents with severe substance abuse and/or disruptive behaviour disorder (DBD).

This 'severity gradient' supported by our finding that MDFT is more effective for those with high severity problems, such as severe substance abuse, is in line with previous research, showing that adolescents with severe cannabis abuse (Rigter et al., 2013) and severe cannabis or substance abusers with comorbid externalising psychopathology benefit most from MDFT (C.E. Henderson et al., 2010; Hendriks, Van der Schee, & Blanken, 2012). This is not surprising, as the treatment goals of MDFT have been designed to serve a broad, heterogeneous group of adolescents with substance use disorders and diverse and complex behaviour problems (C.E. Henderson et al., 2010; Weisz & Kazdin, 2010). Over the years different versions of MDFT have been designed and tested in different countries, in samples with different ages, gender, psychopathology, and in different setting, including clinical and juvenile justice settings. From our findings it seems that MDFT is effective in a variety of settings and for different adolescents, however, the largest effects are found for those with high severity problems. Our finding is consistent with the risk principle of the Risk-Need-Responsivity (RNR)-model, (Andrews et al., 1990; Andrews et al., 2006, 2011) which states that the intensity of interventions should match recidivism risk: those with increased recidivism risk (i.e., with more severe conditions) should receive more intensive treatment. Our findings support the notion that treatment

effectiveness of intensive, comprehensive treatment programmes is better for severely affected youths. Specifically, for MDFT this means that although MDFT is applicable for a broad spectrum of problems, the treatment appears to have surplus value for the most severely impaired youth.

In the model with multiple moderators, an effect of year of publication was found. In early publications, effect sizes for MDFT were larger than in later publications. One possible explanation for this finding would be the "decline effect", a term coined by Ioannidis (2005). He stated that early research is usually small and may be more likely to produce positive results supporting the hypotheses examined than later, larger studies, in which regression to the mean might occur. However, given that we did not find a moderating effect of sample size, this explanation is not likely. It is more likely that confounding moderator, not examined in this meta-analysis, may explain the effect of publication year. Although we have coded many study characteristics, data on features of the intervention, such as different versions of MDFT, or levels of treatment integrity were not available, and therefore we did not examine these potential moderating characteristics.

Further, effects of MDFT on different treatment outcomes, including substance abuse, delinquency, externalising, and internalising psychopathology, and family functioning were about equal in effect size. This suggests that MDFT affects a broad range of domains which may be explained by the multi-focussed approach of MDFT (Liddle, 2002; Liddle & Rigter, 2013). An important finding, enhancing the applicability of MDFT is that this therapy appeared to be similarly effective for boys and girls and for adolescents with different ages, SES and ethnic background, as these were no significant moderators of the effectiveness of MDFT. With regard to age, this is not consistent with an earlier study, which found MDFT to be more effective when the intervention was aimed at younger adolescents, (Hendriks et al., 2011) however, this study has a relatively small sample size, not representative compared to the current meta-analysis. Some studies postulate the development of specific interventions aimed at girls, (e.g. Hipwell & Loeber, 2006) the present meta-analysis found that MDFT is beneficial for a varied group of male and female adolescents from different ethnic backgrounds.

To our knowledge, this is the first meta-analysis on MDFT, using three-level analytic techniques. This novel three-level analytic method makes it possible to study the influence of moderators more extensively and increases statistical power, which allowed us to test the described severity gradient. Another strength of the present meta-analysis is that we only included randomised control trials (RCTs) comparing MDFT with other evidence based, effective therapies, which is considered to be the most robust research design and best equipped to handle threats to a study's internal validity (Weisburd, Lum, & Petrosino, 2001; Welsh, Peel, Farrington, Elffers, & Braga, 2011). Notwithstanding the strength of the present meta-analysis, our findings should be interpreted in the context of some limitations. First, there is a lack of studies that examined family functioning as an outcome measure. Family functioning is considered to be a major focus in the treatment model for MDFT (Dakof, Cohen, & Duarte, 2009). Therefore, more studies regarding family functioning are necessary. Second, although a RCT is considered to be the best research design, there are scholars postulating that due to the selection procedure of RCTs, we should be cautious to generalise the findings in experimental settings to routine youth care (Holly Barrett Waldron & Charles W Turner, 2008). Within clinical samples, there is generally much heterogeneity in adolescent characteristics (e.g., age, substance abuse, delinquency, psychiatric comorbidity). Therefore, adolescent subgroups, within these clinical samples, may differ considerably in treatment outcome (Chan, Dennis, & Funk, 2008; Daudin et al., 2010). Finally, in the current meta-analysis we were unable to examine various types of criminal behaviour, which could generate additional insight. In the five studies that reported delinquency, only one study analysed the influence of MDFT on various types of criminal behaviour (e.g., person crimes, theft, etc.) (Dakof et al., 2015).

For future research we strongly suggest other established treatments addressing substance abusing adolescents with comorbid behaviour problems to test the severity gradient for substance abuse, externalising disorders and possible other important variables, to be able to better match treatment with the characteristics of an adolescent (Bell, Marcus, & Goodlad, 2013; Leijten et al., 2015). Specific for MDFT, one of the directions of future research should be to intensively investigate family

functioning as a moderator of the effectiveness of MDFT. Some studies addressed this quintessential topic for MDFT (Henderson, Rowe, Dakof, Hawes, & Liddle, 2009; Schmidt, Liddle, & Dakof, 1996; Shelef, Diamond, Diamond, & Liddle, 2005). Nevertheless, more research on family functioning is necessary. A further research topic of interest is to study the impact of MDFT on different indices of criminal behaviours (Dakof et al., 2015). This type of research could provide more precise information for which type of adolescents MDFT is the most effective. Moreover, MDFT is an intensive treatment, which is considered to be more expensive than most alternative therapies, and therefore, conducting cost-effectiveness studies carries substantial relevance.

Practical implications of the present meta-analysis are that treatment delivery systems should aim to provide different treatment modules matching the severity of problem behaviours of the youth. MDFT has addressed this issue extensively, by developing diverse modules and researching varied subgroups of adolescents (S. A. Brown & Zucker, 2015; Weisz & Kazdin, 2010); most other treatments targeting this heterogeneous group of adolescents are advised to follow suit. The feasibility of this suggestion can be debated; however, for society the improvement of the quality of care for this group of adolescents is of major importance.

Finally, MDFT, although suitable for a broad spectrum of adolescents with behaviour problems, may be most suitable for adolescents with severe problems, severe substance abuse and disruptive behaviour disorder in particular. Furthermore, this finding could indicate that other less intensive and expensive treatments, for example individual CBT, may be as appropriate for addressing SUD and comorbid psychopathology in adolescents with less severe problem behaviour.

In summary, we conclude that MDFT has an incremental, 13 % advantage over other established treatments. As a unique asset, MDFT can be successfully deployed in male and female adolescents from diverse ethnic backgrounds in a variety of settings, with SUD, delinquency, and diverse comorbid conditions, notwithstanding their age. Furthermore, MDFT was

found to be more effective for adolescents with severe problem behaviour. As such, MDFT can be regarded as a valuable therapy, especially when treating the most challenging group of youth.

3

COMMON ELEMENTS OF EVIDENCE-BASED SYSTEMIC TREATMENTS FOR ADOLESCENTS WITH DISRUPTIVE BEHAVIOUR PROBLEMS

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Submitted

ABSTRACT

Introduction

A growing number of evidence-based family treatments for adolescents with disruptive behaviour problems exist. However, it is not clear to what extent these treatments have unique and common elements. The identification of common elements included in the different treatments would be beneficial for the further understanding and development of family-based treatments, training of therapists and research. Therefore, the aim of this study is to identify common elements of evidence-based family treatments for adolescents with disruptive behaviour.

Method

All articles available between 1968 and 2017 on family-based interventions for adolescents with disruptive behaviour problems were analysed to select evidence-based treatments. Five were identified: Multi Systemic Therapy (MST), Functional Family Therapy (FFT), Multidimensional Family Therapy (MDFT), Multidimensional Treatment Foster Care (MTFC) and Brief Strategic Family Therapy (BSFT). Original authors were contacted to participate in the study by providing treatment materials. All treatment materials were coded to identify the core intervention elements by a team of researchers and clinicians after which comparisons were made to determine the common elements across treatment programmes. The validity of these elements was confirmed through a survey of national and international experts using a modified Delphi technique.

Results

Between the five studied treatments a large number of commonalities were found. Six treatment mechanisms (e.g. *engagement*, *alliance*, and *interactional focus*), four treatment parameters (*caseload, duration, educational level therapists, and therapy dosage*) and 16 treatment techniques (e.g. *conflict management and communication skills*) were identified.

Conclusions

Several common elements of family-based interventions were identified, revealing a strong overlap between the interventions. Further, investigation of these common mechanisms and techniques could potentially build a strong universal systemic treatment for a broad spectrum of adolescents with problem behaviours.

INTRODUCTION

Numerous protocolised family treatments for adolescents with disruptive behaviour problems and substance abuse (conduct disorder, oppositional defiant disorder, delinquency, and drug abuse) have been developed and proven to be effective (Carr, 2009; Van der Pol, Hoeve, et al., 2017; Van der Stouwe et al., 2014; Woolfenden, Williams, & Peat, 2001). This leaves families, therapists and policy makers with the question which of the available treatments to choose (Hawley & Weisz, 2002). Matching a specific adolescent with the best available treatment becomes even more challenging if the adolescent population is highly diverse due to diagnostic comorbidity and complex family contextual profiles (Andrews et al., 1990; Jensen & Weisz, 2002; Vermeiren, 2003; Vermeiren, Jespers, & Moffitt, 2006). Over the last years, some local reports on differences between the interventions have been published in different countries (Baglivio, Jackowski, Greenwald, & Wolff, 2014; Berg-le Clercq, Zoon, & Kalsbeek, 2012). Whereas most of the research to date tests the efficacy or effectiveness of different specific treatment models against each other or against control conditions, much could be learned from research examining the similarities in treatment approaches.

Debates have been going on favouring one intervention over the other, thereby creating disparity instead of a joint effort to develop more high-quality family interventions for those in need. In itself it is preferable if clients and therapists have different interventions to choose from, to match the treatment to the client's specific needs, learning style and motivation (Andrews et al., 2006, 2011; Bonta & Andrews, 2007). However, as family interventions all portray themselves to have a multi-systemic approach, it is also likely that many treatment elements being used have a common base (Tuerk, McCart, & Henggeler, 2012). Identifying the common elements that constitute this base would further explicate the structure of family interventions and clarify the key mechanisms and therapeutic techniques through which family treatments work. This could improve the therapeutic working environment and stimulate the integration and cooperation of the research field. As a result, it could lead to collaboration on implementation of high quality family treatment approaches and improve general training of professionals, especially in societies where fewer resources are available.

And last, it could advance joint learning and understanding as different interventions may have used different operationalisations of common elements providing more options for tailoring to the specific client.

Family treatments emerged in the 1950s, within a variety of settings in the United States and the United Kingdom (Carr, 2012; T. Sexton et al., 2011). The founding principle that united the pioneers of family treatments was that human problems are basically interpersonal. Thus, to resolve psychological disorders, an intervention which directly addressed relationships between people was required. This view, driven by research which pointed out the role of family factors in the aetiology of psychiatric disorders and the ineffectiveness of individual treatments, contravened the prevailing therapeutic attitude that all psychological problems are manifestations of essentially individual disorders. During the 1970s and 1980s, multiple therapists like Uri Bronfenbrenner, Jay Haley, and Salvador Minuchin boosted the popularity and the implementation of family treatment approaches worldwide (Bronfenbrenner, 1979; Haley, 1973; Minuchin, 1974). From the 1990s onwards, family treatments have been further professionalised. Manuals describing more refined systemic theories, which incorporated strongholds of psychoanalytic, client centred, and cognitive behavioural techniques, were developed and subsequently studied (e.g., Henggeler et al., 2009; Liddle, 2015a; T.L. Sexton, 2000).

The next logical step would be to analyse the commonalties and underlying mechanisms of family therapies using an evidence-based identification model (Chorpita, Daleiden, & Weisz, 2005; Garland et al., 2008). This approach postulates that there are common elements across multiple (family) treatment protocols for similar disorders (Chorpita, Becker, Daleiden, & Hamilton, 2007; Garland et al., 2008). They state that most therapists do not fully embrace the use of specific treatment manuals and many regard manuals as too mechanistic and rigid (Addis & Krasnow, 2000). Furthermore, a common element approach is considered to be more flexible and easier to implement in the sturdy existing service context. Therefore, the aim of the present study is to identify the common elements: *treatment mechanisms, treatment parameters, and treatment techniques*, used in family therapies for adolescents with disruptive behaviour problems and substance use problems (conduct disorder, oppositional defiant disorder, and substance use disorders).

METHOD

To identify the common elements for evidence based family treatment for adolescents with disruptive behaviour problems, we used a methodology developed by Garland et al. (2008). This procedure is an open-ended methodology to identify common elements for individual treatments for children with disruptive behaviour and an adaptation of the Delphi Technique. The Delphi Technique is a well-established iterative group judgment procedure, aiming to identify the quality of care indicators (Hsu & Sandford, 2007). This methodology combines an expert opinion survey and interviews to reach clinical consensus. In the present study, the review process consisted of three phases: literature search, analysing treatment materials, interviewing experts.

Literature search to select evidence-based family therapies for adolescents with problem behaviour

A literature search was conducted in PsycINFO, PubMed, Embase and Web of Science, with the purpose to find articles about family therapy for adolescents with disruptive behaviour problems. The criteria were: 1. The treatment had to be primarily family oriented, 2. The age of the treated population had to be between 12 and 18 (adolescents), 3. The treated population had to be diagnosed with at least one externalising disorder (defined here to include conduct disorder (CD), and/or oppositional defiant disorder (ODD), and/or substance use disorder).

The literature search yielded 2361 articles published between 1968 and 2017. After removing duplications, a selection of relevant articles, by the third and first author, was made based on the information found in the abstract, resulting in 117 articles (see figure 1, flowchart of literature search). After analysing the relevant articles, we selected the family treatments that showed at least probable efficacy as defined by the American Psychological Association's criteria (Fidler, 2010). The final selection consisted of five evidence-based family treatments: Multi Systemic Therapy (MST), Functional Family Therapy (FFT), Multidimensional Family Therapy (MDFT), Brief Strategic Family Therapy (BSFT) and Multidimensional Treatment Foster Care (MTFC).

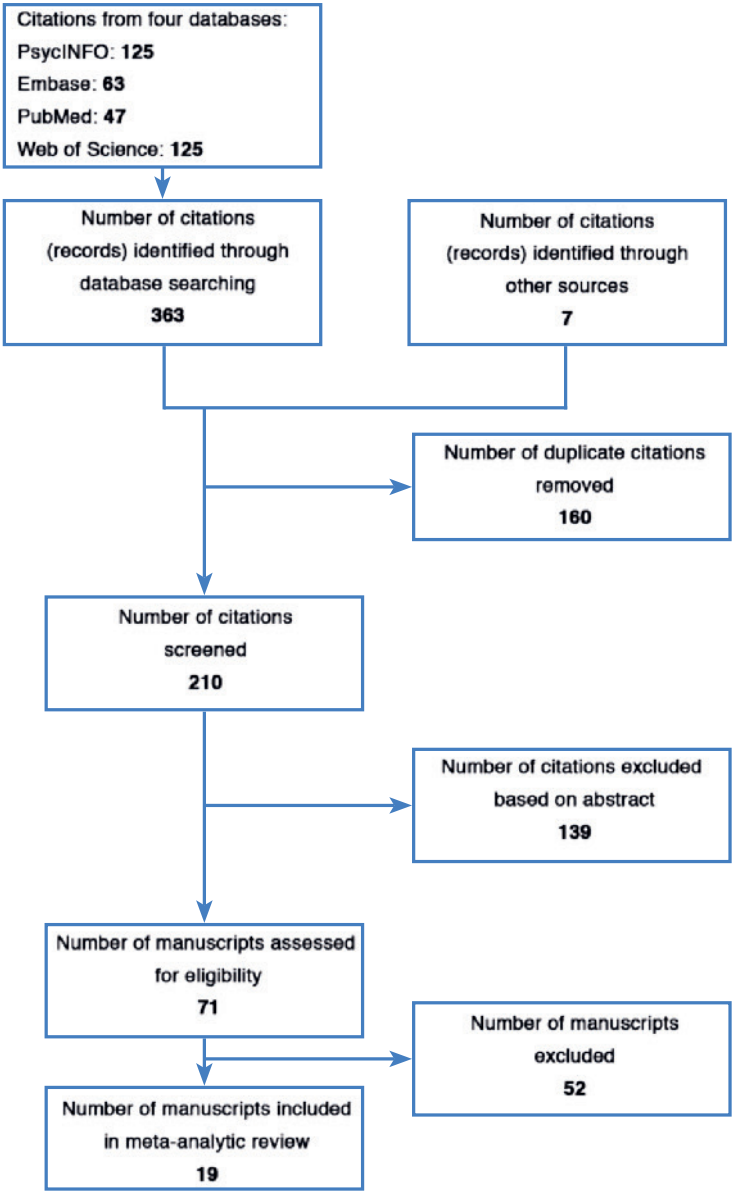

Figure 1. Flowchart of literature search for articles for evidence-based family therapies.

Analysing treatment materials and extracting the core treatment interventions/elements

We collected family treatment materials of the five selected family treatments by contacting the original authors and studying relevant articles identified in the literature search. Treatment manuals for two of the five treatments (MTFC, BSFT) were not available. For these treatments the available books, and relevant articles were analysed. The materials for each treatment were examined by at least four team members. The research team consisted of 12 experienced researchers and/or clinicians; six had a PhD in psychology or medicine. The purpose of the independent review process was to exclude biased observations and to identify the elements for each family treatment as presented in the treatment materials.

The treatment elements can be described in various ways: very specific, broken down in different steps or more general. For example, positive reinforcement consists of engaging positive physical, verbal and material rewards, relabelling, strategic attention and shaping. For the purpose of clarity in this study the general definitions of treatment elements were used. To be considered as a valid treatment element, the element had to be described in the treatment material and there had to be explicit details about how to use this specific treatment element (for example duration, frequency and manner). Each individual coder created a preliminary list of treatment elements based on their analysis of the treatment materials. The next step was to reach consensus about the intervention elements for each treatment. The research teams assigned to each treatment, had a face-to-face meeting for reaching consensus on the treatment elements for each treatment. Finally, each group presented the results to the full group for feedback, discussion and consensus on the treatment elements for all treatments. Whenever there was a disagreement, the materials where studied again until consensus was reached by all the research members. Following the review and consensus process of the five family treatments, all the treatment elements where tallied and compared. Finally, after this process, a treatment element was considered to be common if it was identified in at least three of the five family treatments. The common elements were classified into three categories.

1. Treatment Mechanisms:
The process through which therapy unfolds und produces change.
2. Treatment Parameters:
A characteristic component which is critical in defining the structure of a treatment.
3. Treatment Techniques:
A specific intervention designed to address dysfunctional feelings, behaviours and cognitions.

Interviewing experts of treatment to achieve expert-opinion consensus

Consistent with the method of Garland et al, we interviewed the developers of the different treatments to obtain consensual validity of the selected treatment elements. We sent our initial list with the treatment elements, with brief working definitions to the developers and primary authors of the reviewed family treatments. We asked the experts of each family therapy if they considered the identified common elements as a common treatment element for evidence-based practice for family therapy for adolescents with disruptive problem behaviour. Furthermore, we invited them to add, if necessary, any missing common treatment element(s) to the list. All of the experts responded. We considered a treatment element as common if a majority of the 5 experts rated the treatment element as a common element. All of our listed treatment elements were endorsed by at least a majority of the experts. As none of the experts noted an additional common treatment element, the preliminary list of treatment elements did not differ from the final list of common treatment elements for family therapy for adolescents with disruptive problem behaviour.

RESULTS

Analysing the five evidence-based treatments for adolescents with disruptive behaviour problems yielded several elements common across the systemic treatment protocols. The final set of common elements is listed in the tables. Table 1 presents the common mechanisms, the number of family therapies in which the mechanism was found, and the definition

of the mechanisms. The common mechanisms which were found in all family therapies are: *engagement*, *alliance*, and *interactional focus*. The complete list of mechanisms is shown in table 1. Table 2 presents the common parameters across all five interventions. The range and/or the average number or a description are given for *caseload, duration, educational level therapists, and therapy dosage*. In table 3 the common techniques are listed, displaying the treatment technique, the number of family therapies in which the technique was identified, the definition of the treatment techniques, and treatment setting(s) for which the techniques are applicable (family, parents, adolescent). The common techniques which were identified in all family therapies are: *conflict management* and *communication skills.* For the complete list of treatment techniques see table 3.

Table 1. Mechanisms for evidence-based family therapy for adolescents with disruptive behaviour.

Treatment mechanism (n of therapies)	**Definition**
Engagement (5, in 5 of the 5 manuals/treatment materials this technique was found)	Motivate all the key-players, get everyone involved to start the process of change. Matching, facilitating and availability are essential. Most important in the first phase of treatment.
Alliance (5)	Create an atmosphere of positive bonds between therapist and client/family members ([foster]parents/siblings) to build rapport/affective bonds for consensual goal setting and establishing a foundation for positive change.
Interactional focus (5)	Family/parent interactions viewed as being stable (not productive) patterns that need to change, i.e., need to shift power balance, improve communication. Family members viewed as resource for change.

Treatment mechanism (n of therapies)	Definition
Developmental process (4)	Interventions are individualised and foster developmental process. Consider the therapeutic process as phasic (motivation phase, change phase, and generalisation phase), continuity is stressed.
Relational assessments/ evaluations (4)	Always assess and evaluate the current situation to be able to act swiftly and to choose the most effective intervention(s)/ techniques. Important in all phases of treatment.
Here and now focus (3)	It is important to emphasise the here and now focus within the communication of the family and for resolving problems/crises.

Table 2. Parameters for evidence-based family therapy for adolescents with disruptive problem behaviour.

Treatment parameter	N (range), Description
Average caseload	9 (4-16)
Average duration (months)	4.2 (3-9)
Educational level therapists	Minimal Master
Therapy dosage (sessions per week)	1-3

Table 3. Techniques for evidence-based family therapy for adolescents with disruptive behaviour.

Treatment technique	Definition	family	parents	adolescent
Conflict management (5, in 5 of the 5 manuals this technique was found)	Identifying and handling conflict in a sensible, fair, and efficient manner.	x	x	x
Communication skills (5)	Improving the way family members talk/ interact with each other and listen to each other. Help the family to work towards a more positive flow of conversations.	x	x	x
Reinforcement (4)	Rewarding positive behaviour with labelled praise, physical, verbal, or material reinforcement, shaping, behaviour reward systems, and/or strategic attention.	x	x	x
Assigning and reviewing homework (4)	Assigning and/or reviewing tasks to complete between sessions, including setting up behaviour charts for implementing at home and practicing skills.	x	x	x
Problem-solving (4)	Method to generate alternative solutions, evaluate options, consider consequences of each option, and provide self-rewards.	x	x	x
Psycho-education (4)	Teaching through didactic instruction or explanation, video or biblio-instruction about topics such as psychopathology, nature of child/family's problems, treatment principles, and child development.	x	x	x

Treatment technique	Definition	family	parents	adolescent
Anticipating/training for setbacks (4)	Predicting future setbacks, relapse prevention.	x	x	x
Divert and interrupt (4)	A negative or blaming interaction between family members is interrupted, followed by diverting the negative speech-act to a more positive one.	x	x	
Reframing (4)	A change of the conceptual and/or setting or viewpoint in relation to which a situation is experienced. To place it in another frame, thereby changing its entire meaning.	x	x	x
Reviewing goals and progress (4)	Reviewing previous work/themes and progress toward meeting established goals.	x	x	x
Special time (4)	Create special quality time with the adolescents.	x	x	x
Limit-setting (3)	Setting limits, activating response cost, giving rewards for positive behaviour, ignoring negative behaviour, giving time-out, delivering commands, punishment.		x	
Enactment (3)	Situations in which a therapist directs family members to talk or interact together about feelings and emotions, in order to observe and modify problematic transactions.	x	x	

Treatment technique	Definition	family	parents	adolescent
Working with boundaries (3)	Therapist shifts the alliances that exist in the family. This means restoring the balance of power to the parents or parent figures so that they can effectively exercise their leadership.	x	x	x
Monitoring (3)	Parental awareness of the adolescent's activities, and communication to the adolescent that the parent is concerned about, and aware of, the adolescent's activity.	x	x	
Reconnecting (3)	In a difficult and negative situation, the therapist can reconnect to positive feelings and emotions by talking about how the relationship was in the past. (Looking at pictures of adolescent when he/she was a baby-toddler).	x	x	

DISCUSSION

We identified common mechanisms, parameters and techniques by analysing the manuals and materials of five evidence-based family treatments for adolescents with disruptive behaviour and substance use problems, using the method as described by Garland et al. (2008). As expected, considerable overlap between the five family-based treatments was found. The listed common elements generate insight of the working elements of family therapies and give an indication of the importance the treatment developers attach to them. For example, the treatment mechanisms: *engagement, alliance, interactional focus,* and the treatment techniques: *conflict management, and communication skills* were identified in all five studied treatments. These elements could possibly have a big impact on positive treatment outcome and are considered important to be further investigated.

Given the substantial overlap, it is of interest to consider the potential implications of these findings. Although many evidence-based family therapies are available, our understanding of the mechanisms of change or precisely how (family) treatments work is still limited. Understanding treatment mechanisms, and knowledge of the most potent treatment techniques is essential to derive and refine treatment strategies, to directly target the mechanisms, remove irrelevant strategies, and develop novel approaches that are more direct, precise and effective (Kazdin, 2007). For family treatments, the present findings suggest potentially important elements to drive further research as well as novel treatment approaches. Furthermore, knowledge of treatment mechanisms and identifying potent treatment techniques may support enhanced precision in matching family treatments to the needs of adolescents and their families to improve treatment impact. Finally, the findings could be used to create, brief, flexible, efficacious treatment modules, which could, after adaptation to cultural contexts, be implemented in low-income and middle-income countries (Holmes et al., 2018). Thus, identifying common elements seems promising and can be an overarching method for the numerous evidence-based treatments developed for specific subgroups.

However, this study has some limitations. For example, sequencing therapeutic techniques, understanding the context of interventions, developing a strategic plan, delivering the exact dosage and/or intensity of a therapeutic technique are all essential parts of effective treatment. The approach of identifying evidence based common elements does not address all of these important issues (Garland et al., 2008). Furthermore, a relative narrow conceptualisation of common factors was studied (Lambert, 1992) as the broad conceptualisation which integrates characteristics of client, therapist, relationship, and expectancy was not studied, due to a lack of information concerning these variables (Hubble, Duncan, & Miller, 1999; Sprenkle, Davis, & Lebow, 2009). For example, it is thought that the alliance between therapist and patient, is crucial for therapeutic outcome (Del Re, Flückiger, Horvath, Symonds, & Wampold, 2012; Lamers & Vermeiren, 2015; Norcross & Wampold, 2011; Van Yperen, Van der Steege, Addink, & Boendermaker, 2010) and although alliance is mentioned in all studied treatments, we could not identify precisely the process of alliance and were therefore not able to deliver a refined description of alliance. Finally, the specific contribution of any one identified common element (e.g. therapeutic technique like *reframing*) or combination of elements is unknown. In addition, some important common elements could have been missed by using the described method of identifying common elements.

The disentanglement of family treatments to identify common elements has numerous implications for research and practice as well. For research, if more studies similar to the present one are conducted, the most potent techniques or combination of techniques could be identified and a useful benchmark could be created for future research. Furthermore, because of the big overlap of evidence-based family treatments research could focus on the identification of the dissimilarities between treatments, to be able to find the most appropriate treatment for a specific subgroup of adolescents. A prerequisite for practical implications for evidence-based family treatments is first to address the heterogeneity of symptoms and high rates of comorbidity within the group of adolescents with disruptive behaviour disorder. Hence, the identified common elements could be used to develop a brief, flexible, modular, efficacious, systemic

treatment training or treatment, (Holmes et al., 2018). This training on how to deliver common elements of evidence-based treatments will need to include significant attention to how and when such elements are likely to be effective for specific clients and families (Garland et al., 2008). The implementation of this universal training and/or treatment could improve the quality of care. Moreover, a universal training/treatment could decrease the resistance of clinicians concerning the implementation of evidence-based practices (Perkins et al., 2007; Weersing & Weisz, 2002). Furthermore it could enhance the basic competencies of clinicians and increase the use of common elements in daily practice (Davis, Thomson, Oxman, & Haynes, 1992). A final practical implication for the identified common elements could be the further improvement and innovation of the existing evidence-based family treatments.

The present findings reveal the substantial communality of evidence-based family treatments for adolescents and help us to understand the layered complex framework of them. Thus, implementing a treatment approach based on the evidence based common elements of family treatments could accommodate further innovative improvements in training clinicians, supervision, and overall quality of care for this challenging group of adolescents.

4

MULTIDIMENSIONAL FAMILY THERAPY REDUCES SELF-REPORTED CRIMINALITY AMONG ADOLESCENTS WITH A CANNNABIS USE DISORDER

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ABSTRACT

Introduction

Multidimensional family therapy (MDFT) is an established treatment programme for youth displaying multi-problem behaviour. We examined if MDFT decreased criminal offending among cannabis abusing adolescents, as compared with individual psychotherapy (IP).

Method

In a Western-European randomised controlled trial comparing MDFT with IP, a sample of 169 adolescents with a cannabis disorder completed self-reports on criminal offending. Half indicated they had committed one or more criminal offences in the 90 days before the baseline assessment. Follow-up assessments were at 6 and 12 months after randomisation.

Results

The proportion of adolescents reporting non-delinquency increased during the study period, most so in the MDFT condition. In addition, MDFT lowered the number of violent offences more than IP. This difference was not seen for property crimes.

Conclusions

In cannabis abusing adolescents, MDFT is an effective treatment to prevent and reduce criminal offending. MDFT outperforms individual psychotherapy for violent crimes.

INTRODUCTION

In adolescents, a behavioural problem – such as substance abuse, criminal offending, truancy, or symptoms of (other) mental health disorder – often is part of a broader multi-problem behaviour constellation (Version 7.1; Griffith-Lendering, Huijbregts, Mooijaart, Vollebergh, & Swaab, 2011; Phan et al., 2011; Skeer, McCormick, Normand, Buka, & Gilman, 2009). Common is the combination of substance use disorder and criminal behaviour (delinquency) (Copeland & Swift, 2009; Y. Hser et al., 2001; Husler, Plancherel, & Werlen, 2005). Substance use disorders have been identified as a risk factor for criminal offending. Conversely, criminal offending is a risk factor for the development of substance use disorders (Moffitt et al., 2002).

Comprehensive treatments targeting multiple problems are likely to be more effective in improving the perspective of the youth than treatments targeting a single behavioural problem (Whitmore & Riggs, 2006). Problematic substance use and criminal offending are influenced by similar risk factors (Moffitt et al., 2002; Mulder, Vermunt, Brand, Bullens, & Van Marle, 2012). The two types of problem behaviour respond to the same kinds of treatment (Baldwin et al., 2012; Hogue, Henderson, Ozechowski, & Robbins, 2014).

In forensic settings, treatment often is embedded in broader intervention programmes, which may also include non-therapeutic guidance and counselling, and rehabilitation services targeting school, work, leisure time activities, and housing. A meta-analysis reviewing 28 studies found no evidence that intervention programmes, overall, decreased criminal offending in adolescents (Schwalbe, Gearing, MacKenzie, Brewer, & Ibrahim, 2012). In contrast, another meta-analysis, based on 73 studies, indicated that intervention programmes may be of modest use in preventing recidivism (Wilson & Hoge, 2013). No doubt, this discrepancy in results is partly due to the large heterogeneity of the studies included in these and other meta-analyses. Some of the studies selected for the various analysis samples focused on a disorder a youth might have (such as conduct disorder), others on measures of self-reported or registered (e.g.,

police arrests) offences, and yet others on a specific judicial programme or process (such as cautioning, diversion, probation, detention, post-release rehabilitation). Added to this heterogeneity is the large variety of intervention approaches, ranging from minimal interventions to a score of individual treatments and to family therapy. Comparison of studies was further hampered by differences and weaknesses in the organisation of the intervention programmes considered (Wilson & Hoge, 2013).

Nevertheless, a few conclusions can be drawn. Programmes involving individual treatment of the adolescent may reduce recidivism, though generally the effect is small and transient (C.E. Henderson et al., 2010; Van der Pol, Hoeve, et al., 2017; Van der Stouwe et al., 2014; Von Sydow et al., 2013). On average, cognitive behaviour therapy (CBT) has the best record among individual treatments (Greenberg & Lippold, 2013; Smeets et al., 2015; Von Sydow et al., 2013). Even better treatment results have been obtained with family therapy. In systematic literature reviews (Greenberg & Lippold, 2013; Von Sydow et al., 2013), meta-analyses (Baldwin et al., 2012; Schwalbe et al., 2012; Van der Pol, Hoeve, et al., 2017; Van der Stouwe et al., 2014), and in randomised controlled trials comparing family therapy with CBT (C.E. Henderson et al., 2010; Hendriks et al., 2011; Schaub et al., 2014), family therapy generally outperformed CBT on one or more measures of recidivism or other antisocial behaviour.

An example of a well-established family-based treatment approach is multidimensional family therapy (MDFT) (Galanter, Kleber, & Brady, 2014). MDFT is an outpatient and inpatient treatment programme for adolescents displaying problem behaviour. The term ‘multidimensional’ means that each major domain in the life of an adolescent is seen as contributing to the incidence and persistence of behavioural problems (through risk factors) and as potentially helpful in resolving such problems (through protective factors). The life domains include the youth him- or herself, parents, family, friends and peers, school and work, and leisure time. MDFT has been found to be more effective than active comparison therapies in various adolescent populations, doses and treatment delivery settings (Greenbaum et al., 2015; Liddle, 2010).

Most findings regarding MDFT are from U.S.-based randomised controlled trials initiated by the developers of this treatment programmes. (Junior-) Ministers of Health from five Western European countries decided to have MDFT independently tested in a European context, in a trial named INCANT (International Cannabis Need of Treatment study) comparing MDFT with individual psychotherapy (IP) (Rigter et al., 2010). INCANT confirmed the pattern of results from American trials. The European therapists delivered MDFT with a high degree of fidelity (Rowe et al., 2013). The therapy improved treatment motivation and lowered cannabis disorder rates in adolescents from outpatient treatment sites in Berlin, Brussels, Geneva, Paris and The Hague (Rigter et al., 2013), and decreased the number of symptoms of externalising disorders (Schaub et al., 2014).

One of the INCANT sites (The Hague) examined the relationship between cannabis use and criminal offending. In delinquent as compared to non-delinquent youth, MDFT outperformed IP in decreasing the number of days on which cannabis was consumed (Hendriks et al., 2012). In U.S.-based studies, MDFT lowered criminal offence rates in adolescents regardless of its effect on substance abuse in Drug Court and diversion settings (Dakof et al., 2015; Liddle, Rowe, Dakof, Henderson, & Greenbaum, 2009). These findings led us to examine MDFT's effect on criminal offending in European adolescents in more detail. In designing INCANT, two of the five INCANT sites – Geneva and The Hague – decided to extend the basic battery of assessments with the Self-Report Delinquency (SRD) Scale. The SRD records the number and types of criminal offences committed by the adolescents over the previous 90 days.

Objectives

The purpose of our study was to examine the effects of MDFT on self-reported criminal offending. We describe here the SRD outcomes for the Geneva and The Hague INCANT sites addressing two hypotheses: (a) across the 12 months follow-up period, both MDFT and IP will decrease the proportion of youth engaged in criminal offences and will reduce the number of offences committed; and (b) MDFT is more effective than IP on both types of outcome measures.

METHOD

Approval

INCANT was approved by medical-ethical committees in all involved countries (Rigter et al., 2010). For Geneva, approval was granted by the Ethical Board for Clinical and Outpatient Research (Medical Association Geneva Canton; Switzerland), and for The Hague by the Medical-Ethical Board for the Mental Health Sector in the Netherlands (METiGG).

Sample and treatment sites

Across the treatment sites in the five countries supporting INCANT, the total number of adolescents recruited for the study was 450. The study flow diagram was published by Rigter et al. (2013). The site (two sub-sites) in The Hague contributed 109 adolescents and the site in Geneva 60, yielding a sample of 169 participants for the current study.

To be included in INCANT, youth (boys and girls) had to be between 13 and 18 years of age and meet criteria for a cannabis use disorder (abuse or dependence) based on the DSM-IV, which was the manual in use when the study was carried out. Dependence and abuse were diagnosed, respectively, if at least 3 of 7 dependence criteria or 1 of 4 abuse criteria had been met. In addition, at least one parent had to indicate that he or she would participate in the treatment if they were randomised to the MDFT condition. Adolescents were excluded if they were requiring inpatient treatment because of psychosis, advanced eating disorder, or severe suicidal ideation (Rigter et al., 2010).

The treatment centres recruited for INCANT were nominated by government officials working together in the INCANT Steering Committee. The sites were visited by MDFT trainers and European project staff and were asked to give presentations and to submit documentation on the mission and funding of the centre, training level and professional background of the therapists, sources of referral of cases, caseload, treatments delivered, and links with research groups. All sites offered outpatient treatment to adolescents with substance use disorders.

The Geneva site was Phénix. In 2004, this foundation created a unit for treating adolescents with substance use disorders. Treatment staff included a psychiatrist, psychologists and social workers. Phénix is a private, non-profit organisation, with treatment costs covered by basic health insurance. There were two treatment sub-sites in The Hague. First, Parnassia Brijder – now called Brijder Addiction Care –, which among other services offers treatment programmes for adolescents with substance abuse problems. The second sub-site was Palmhuis, the forensic unit of De Jutters, which is the child and adolescent mental health institute serving The Hague and the surrounding region. Both sites are private, non-profit organisations, with treatment being paid, at the time of the study, by national, regional and local governments and through insurance funds. The MDFT team was a joint enterprise of the two sub-sites, with therapists (psychologists and social workers) from both organisations being members of the team.

Treatments

At both sites, the therapists were experienced in treating behaviourally troubled adolescents. In Geneva, MDFT was delivered by 3 MDFT certified therapists and IP by another 3 therapists. The corresponding numbers for The Hague were 6 and 12 therapists. The characteristics of these professionals (age, gender, years of experience, background) did not differ between Geneva and The Hague, or between the two treatment conditions (Rowe et al., 2013).

When preparing for INCANT, we assessed the usual treatment provided at each of the recruited sites. Although sites confessed to different theoretical orientations, e.g., mainly psychodynamic in Geneva and cognitive-behavioural in The Hague, in practice treatment as usual was individual psychotherapy (IP), consistently involving enhancement of treatment motivation, sessions with the individual adolescents (not with the parents except to inform them on treatment progress), and relapse prevention (Rigter et al., 2013; Rigter et al., 2010).

MDFT consists of three stages. The first one focuses on intensively enhancing treatment motivation, building multiple therapeutic alliances, and drafting the treatment plan. In stage 2, treatment plan interventions

targeting the youth and his or her family are carried out, including education about adolescence, behavioural development, and risk factors for problem behaviour; relapse prevention; improving family communication and relationships; and strengthening parental educational skills. Stage 3 involves sealing off the treatment, agreeing on a relapse prevention plan, and providing booster sessions if needed.

In INCANT, both MDFT and IP were scheduled to last for 6 months. MDFT was delivered in approximately two sessions per week – in roughly equal proportion to be held with the adolescent, parent, and family (adolescent and parent together). In IP, the number of sessions with the adolescent was matched to be similar to MDFT. However, the total number of IP sessions was lower than for MDFT, as there were no sessions with parents and family. Rowe et al. (2013) present details on the actual treatment dose received; this paper also documents the efforts to evaluate and safeguard treatment integrity and fidelity.

Design

INCANT was a multi-centre phase randomised controlled effectiveness trial with an open-label, parallel group design, running from 2006 to 2010. Assessments were scheduled at baseline – immediately before randomisation and start of treatment – and at 3, 6, 9 and 12 months thereafter (Rigter et al., 2010). The SRD was administered at baseline and 6 and 12 months follow-up. Randomisation occurred immediately after the eligibility of the case had been confirmed at baseline. The INCANT database, at the Department of Public Health of Erasmus Medical Centre in Rotterdam, assigned a code to each new case entered by a site's research assistant and automatically informed her about the allocated treatment. In order to conceal the randomisation process, trial staff was not involved in any step of the procedure (Rigter et al., 2010).

Outcome measures

The measurements were delivered at baseline, at 6 months (if planned), and at 12 months follow-up.

Cannabis use

Frequency of cannabis use by the adolescents was recorded with the Timeline Follow-Back method (TLFB), as adapted and validated for adolescents (Sobell & Sobell, 1992; Holly Barrett Waldron & Charles W Turner, 2008). The TLFB obtains reports of daily cannabis use for the 90 days preceding the assessment, using a calendar and other memory prompts.

Cannabis use disorders (abuse and dependence)

Cannabis use disorders were identified with the Adolescent Diagnostic Interview-Light (ADI-Light). This structured multi-axial interview generating DSM-IV diagnoses has good psychometric properties, as assessed in reliability and validity tests (Winters & Henly, 1993). The ADI-Light was administered at baseline and at 12-month follow-up.

Criminal offences

To trace the number and type of offences committed by the adolescents, we administered the SRD, the Self-Report Delinquency Scale (Elliott, Huizinga, & Ageton, 1985), asking the youth how many and which type of criminal offences they had committed in the past 90 days. We analysed SRD scores for the classes of property crimes and of violent crimes (aggression, violent sexual offence, violent property offence), respectively, and for these types of crimes together (total scores). The SRD scored well in tests of reliability and validity (Elliott et al., 1985).

Statistical analyses

Baseline characteristics

Between-treatment equivalence was tested with analyses of variance for continuous variables, and chi-square tests for categorical variables.

Changes over time across treatment conditions

Latent growth curve (LGC) modelling with robust maximum likelihood estimation was used to analyse change for each adolescent. The missing at random (MAR) assumption could not be directly evaluated. We explored the reasonableness of the MAR assumption holding with these data by checking if there were significant correlations between key

study variables and a binary variable indicating whether the data were missing or not (1 = missing at follow-up assessment, 0 = not missing). As correlations were negligible ($r < 0.10$), we treated incomplete data as MAR and accounted for it in subsequent models using Full Information Maximum Likelihood estimation (Little & Rubin, 2002). We included a dummy coded variable representing treatment condition (IP = 0; MDFT = 1) in the model to test the equivalence of groups at baseline and the impact of intervention type on change over time (i.e., the intercept and slope growth parameters). Intervention effects were demonstrated by a statistically significant slope parameter, as tested by the pseudo-z test associated with treatment condition. LGC modelling was carried out with Mplus (Version 7.1; Muthén, 2016).

Density plots revealed a high proportion of participants reporting no criminal offences at each follow-up assessment. Therefore, we used a two-part growth modelling approach (E. C. Brown, Catalano, Fleming, Haggerty, & Abbott, 2005; Liddle et al., 2009) to estimate separate but correlated continuous and categorical LGC models. This approach was developed to address non-normality caused by a preponderance of zeros (Olsen & Schafer, 2001). As implemented in Mplus, two-part growth modelling applies a natural log transformation to the continuous outcomes. The modelling approach was successful in bringing skewness and kurtosis below acceptable levels (below 1.5). Further, we used the robust maximum likelihood estimator for all analyses to minimise the impact of non-normality on the results.

Effect sizes

The effect size parameter *d* for treatment comparisons was computed using Feingold's method for calculating effect sizes with growth curve models (Feingold, 2009). A *d* in the range of 0.30 - 0.70 indicates that the effect was of moderate size; higher *d* values reflect strong effects.

RESULTS

Missing values

There were no missing data at baseline. At 12 months follow-up, 28% of the adolescents did not complete the SRD. There were no differences between treatments in this respect (X^2 [1] = 0.40). However, the rate of missing SRD forms was higher in Geneva than in The Hague, X^2 [1] = 50.62, $p < 0.01$.

Baseline

Table 1 presents baseline data for the two sites and two treatment conditions. Both across sites (the columns 'Total') and per site, the adolescents from the two treatment conditions were similar in age and gender, and in characteristics of their parents (divorce rate; prevalence of mental health and substance use problems). However, when comparing the two sites with each other across treatment conditions, the two populations of adolescents differed in foreign descent (rate higher in Geneva; X^2 [4] = 10.88, $p = 0.03$), and proportion of youth living with their family (rate higher in The Hague; X^2 [3] = 13.48, $p = 0.004$). Also, the two populations were distinct from each other on cannabis use measures (days of use: F [1, 167] = 9.56, $p = 0.002$; proportion of adolescents being dependent on cannabis: X^2 [1] = 17.13, $p < 0.001$). Cannabis dependence was more common among the adolescents in Geneva than in The Hague, although the self-reported number of cannabis use days was lower in Geneva. Within sites, the variables mentioned did not statistically differ between the two treatment conditions.

Table 1. Baseline data for the The Hague and Geneva sites.

Variable	The Hague MDFT	The Hague IP	Geneva MDFT	Geneva IP	Total MDFT	Total IP
Mean age ± SD	16.2 ± 1.3	16.3 ± 1.2	16.1 ± 1.2	16.0 ± 1.2	16.2 ± 1.3	16.2 ± 1.2
Male	80%	80%	90%	93%	83%	85%
From foreign descent	46%	48%	73%	60%	58%	55%
Attending school	77%	74%	67%	70%	74%	73%
Living with family	98%	98%	82%	83%	90%	93%
Parents separated	60%	56%	63%	53%	61%	55%
Parents with mental health or substance use problems	29%	26%	33%	33%	31%	29%
Behaviour						
Total[#] nr. of self-reported criminal offences ± SD*	5.8 ± 13.8	6.4 ± 18.5	8.5 ± 18.6	8.9 ± 20.3	6.8 ± 15.6	7.3 ± 19.1
Cannabis use days ± SD*	64 ± 23	61 ± 24	47 ± 25	52 ± 29	58 ± 25	58 ± 26
Cannabis dependence	73%	78%	90%	97%	77%	77%

* In the 90 days before the baseline assessment. SD = standard deviation.

Criminal offences = property and violent crimes taken together.

Change in criminal offence rate

Preliminary analyses

At baseline, 43% of the adolescents said that they had not committed any criminal offence in the preceding 90 days. Forty-eight percent of participants reported they had committed a property crime, and 33% a violent crime. At this point in time, there were no differences between treatment groups in proportion of adolescents reporting any (X^2 [1] = 3.06, *ns*), property (X^2 [1] = 1.21, *ns*), or violent (X^2 [1] = 2.83, *ns*) crimes.

Offences of any type: changes over time across treatment conditions

Over the 12 months follow-up period and across sites, the number of self-reported criminal offences dropped in both the MDFT and IP groups, with 70% and 46%, respectively, with no significant difference noted. Looking per site, the decline in number of offences was similar in the MDFT and IP groups in The Hague (77% versus 72%), but dissimilar in Geneva (35% decrease in the MDFT condition versus 35% *increase* for IP). Across treatments, the *proportion* of youth reporting no criminal offences (represented by the categorical part of the frequency model) slightly increased from baseline to follow-up assessments (Mean Slope = -0.28, standard error [*SE*] = 0.16, *pseudo-z* = -1.79, $p = 0.07$). Among those reporting they had engaged in criminal offending during the study period (the continuous part of the model), the *number* of criminal offences decreased over time (Mean Slope = -0.21, *SE* = 0.08, *pseudo z* = -2.54, $p = 0.01$).

Abstaining from criminal offending: treatment comparisons

Comparing the treatments in the categorical model, more youth receiving MDFT reported abstaining from any type of criminal offence over time than corresponding IP youth (Treatment Slope = -0.70, *SE* = 0.33, *pseudo z* = -2.14, $p = 0.03$, $d = 0.51$); see Figure 1, Panel 1. This pattern of results held for both property crimes (Slope = 0.34, *SE* = 0.05, *pseudo z* = 6.92, $p < 0.01$, $d = 4.95$) and violent crimes (Slope = 0.39, *SE* = 0.05, *pseudo z* = 8.53, $p < 0.01$, $d = 7.53$).

As for the *number* of criminal offences of any type, the two treatments did not differ in the continuous part of the model (Treatment Slope = -0.01, *SE* = 0.17, *pseudo z* = -0.07, *ns*, *d* = 0.01; see Figure 1, Panel 2). The number of *total* criminal offences declined in both treatment groups, with no advantage of MDFT over IP. The decrease in the number of criminal offences was marginally larger in The Hague than in Geneva (Slope = 0.29, *SE* = 0.17, *pseudo z* = 1.68, *p* = 0.09, *d* = 0.79).

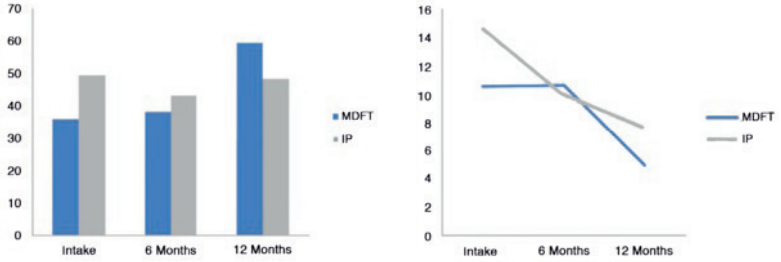

Figure 1. Change in proportion of youth reporting abstaining from delinquency (Panel 1) and number of delinquent acts among those persisting in delinquent behaviour (Panel 2).

Committing property crimes versus violent crimes: treatment comparisons

We divided the total criminal offences category into property and violent crimes. Among youth engaging in property crimes over the 12-month follow-up period, the number of these offences among those reporting delinquent behaviour dropped over time (Slope = -0.37, *SE* = 0.17, *pseudo z* = -2.17, *p* = 0.03); Figure 2. MDFT and IP did not differ in this respect in either the continuous (Slope = -0.11, *SE* = 0.22, *pseudo z* = -0.50, *ns*, *d* = 0.10) or categorical part of the model (Slope = 0.07, *SE* = 0.06, *pseudo z* = 1.18, *ns*, *d* = 0.28).

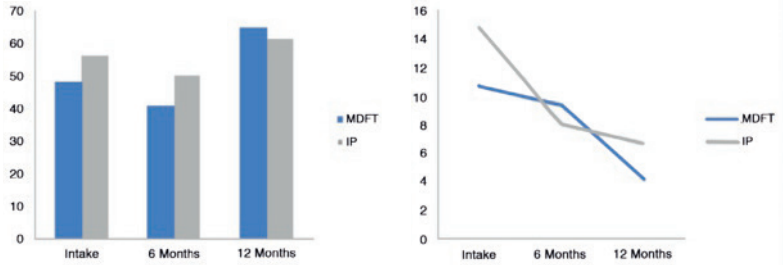

Figure 2. Change in proportion of youth reporting abstaining from property crimes (Panel 1) and number of property crimes among those committing property crimes (Panel 2).

For violent crimes, the overall *proportion* of adolescents engaging in violent crimes did not change over time (Slope = 0.02, *SE* = 0.03, *pseudo z* = 0.46, *ns*). However, when treatment condition was entered into the calculations, more youth receiving MDFT rather than IP reported to have abstained from violent offences (Slope = 0.10, *SE* = 0.05, *pseudo z* = 2.07, *p* = 0.04, *d* = 0.43).

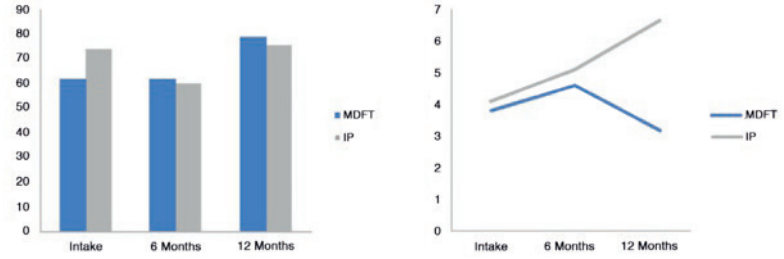

Figure 3. Change in proportion of youth reporting abstaining from violent crimes (Panel 1) and number of violent crimes among those committing violent crimes (Panel 2).

The *number* of violent crimes among self-reported violent offenders did not change over time (Slope = 0.11, *SE* = 0.15, *pseudo z* = 0.74, *ns*). Comparing the two treatments, the adolescents receiving MDFT tended to commit fewer violent offences over time than their IP counterparts, but although the effect size was moderately large, the difference between the treatment groups was not statistically significant (Slope = 0.23, *SE* = 0.20, *pseudo z* = 1.13, *ns*, *d* = 0.63); Figure 3.

DISCUSSION

All adolescents in the present study had a cannabis use disorder at baseline, mostly cannabis dependence. Half of them reported having committed one or more criminal offences in the 90 days before the baseline assessment, i.e., the moment of their recruitment in the INCANT randomised trial. Across all youth, the number of self-reported criminal offences per period of 6 months dropped going from baseline to the 12-months follow-up assessment. In other words, both MDFT and IP appeared to be effective in decreasing criminal behaviour, in accordance with our first study hypothesis. MDFT was as effective in this respect as IP, which would appear to run counter to our second study hypothesis, which stated that MDFT would outperform IP. Yet, the second study hypothesis was confirmed in part. Dividing criminal offences into property and violent crimes revealed a treatment difference. The drop in property crimes was similar in the MDFT and IP conditions, but the decrease in violent crimes was larger for MDFT than for IP.

We do not know of any publications clearly showing differential treatment effects on committing property crimes versus violent crimes in adolescents. The offence measures used by Dakof et al. (2015), who found MDFT to be superior to Drug Court group therapy, included ‘serious crimes’, but without clear distinction between property and violent offences. However, there are epidemiological data suggesting that treatment of delinquent adolescents should be tuned to certain characteristics of these youth. The literature contains many attempts to draft a typology of delinquent youth.

Most often mentioned (disregarding sexual offenders) is the distinction between violent offenders, non-violent (property) offenders, and versatile offenders who commit both violent and property crimes (Lai, Zeng, & Chu, 2016). For these three classes of adolescent offenders, different profiles of risk factors apply (Colins, Vermeiren, Schuyten, & Broekaert, 2009; Lai et al., 2016; Mulder et al., 2012). Most impaired in risk factor exposure and mental and behavioural health are the versatile offenders (Lai et al., 2016), who in our study were labelled as violent offenders, because violent property crimes were classified as violent offences. The excess of risk factors facing violent/versatile offenders appears to be concentrated on the 'mental comorbidity' (Colins et al., 2009), 'family' (e.g., poor parental supervision) and 'peers' (wrong friends) dimensions (Lai et al., 2016; Mulder et al., 2012).

Why would family therapy work out better in reducing delinquency in adolescents than individual therapy? Both types of treatment are effective in decreasing criminal offending. The surplus value of family therapy may be explained by the ambition to have this type of treatment address risk factors not only at the individual level (the adolescent with his or her personality traits and response patterns), but also at the family, peers, school/work and leisure time levels. The latter factors strongly influence the behaviour of an adolescent (Lai et al., 2016; Leve, Chamberlain, & Kim, 2015; Wilson & Hoge, 2013), strengthening the case for family therapy.

MDFT is not the only family therapy with credits in treating criminal youth. From U.S. research, five major programmes have emerged (Leve et al., 2015), with Multisystemic Therapy (MST) and MDFT probably having the best research record in Europe, in addition to good performance in the USA (Van der Pol, Hoeve, et al., 2017; Van der Stouwe et al., 2014). The evidence suggests that MDFT has effect in 'light' cases, but certainly is to be preferred in 'severe' cases. In substance abuse research (Henderson et al., 2010; Rigter et al., 2013), MDFT was as effective as individual psychotherapy in reducing problem behaviour for all cases together. However, MDFT did better than IP in 'severe' cases, however defined. Our present results suggest that the same may be true for the effect of treatment on criminal offending in adolescents. MDFT and IP are both effective in reducing self-reported criminal offences, but MDFT

outperforms IP in violent/versatile offenders, who might have been more severely impaired than the offenders committing property crimes (Colins et al., 2009). Clearly, more research is needed here.

A special finding of our study was that MDFT may not only lower recidivism rates, but also may help to prevent first-time offences. In our trial, the proportion of non-delinquent youth grew somewhat during the study period, most clearly so for adolescents receiving MDFT. A recent meta-analysis confirmed that intervention programmes may prevent (the first incident of) criminal offending. Effective programmes are family-oriented and 'multimodal' (multidimensional, in MDFT's terminology) (Vries, Hoeve, Assink, Stams, & Asscher, 2015). Our findings are in keeping with this conclusion.

A strength of the INCANT trial was that it excluded few adolescents from taking part in the study. The trial's aim was to achieve a high external validity level. The sites differed in many respects, such as in referral practices, i.e., the route of bringing an adolescent and his or her family into contact with a treatment centre. Many Swiss adolescents recruited for INCANT had been referred to the trial by a juvenile judge. So, the high rate of criminal offending in the Geneva youth is not surprising. The adolescents from The Hague, who were regularly referred from non-Justice sources, were probably less impaired than the Geneva youth (Phan et al., 2011). Yet, despite these differences in referral pathways, MDFT appeared to be effective at all sites in all countries (Phan et al., 2011; Rigter et al., 2013). This is confirmed in the present paper. A possible weakness of the study was that the criminal offence data were based on self-report. Self-report data may be biased. However, the jury is still out on the question if supposedly more objective database records (on arrests, convictions) are a better source of information (Kirk, 2006). Database records only contain data on registered criminal offences; self-report invites respondents to also report criminal offences that went unnoticed to police and justice authorities. In a separate paper, we will describe results for a database measure of criminal offending, i.e., police arrests of The Hague INCANT youth in the 3 years following randomisation, which confirmed that MDFT lowers criminal offence rates in adolescents.

From a policy perspective, we would recommend that in juvenile forensic settings treatment programmes are to be implemented that do not focus on just one behavioural problem, but on the common multiplicity of behavioural problems. Also, it is advisable to opt for an evidence-based family therapy rather than an individual treatment targeting the adolescent him- or herself. The broader approach of family therapy is likely to more strongly reduce recidivism rates of serious (violent/versatile) crimes than individual treatment, in addition to having a preventive effect on criminal offending in general.

5

MULTIDIMENSIONAL FAMILY THERAPY IN ADOLESCENTS WITH A CANNABIS USE DISORDER: LONG-TERM EFFECTS ON DELINQUENCY IN A RANDOMISED CONTROLLED TRIAL

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ABSTRACT

Introduction

Substance use and delinquency are considered to be mutual risk factors. Previous studies have shown that multidimensional family therapy (MDFT) is effective in tackling both conditions on the short term. The current study examines the long-term effects of MDFT on criminal offending.

Method

109 adolescents with cannabis use disorder and comorbid problem behaviour were randomly assigned to either MDFT or cognitive behavioural therapy (CBT). Police arrest data were collected for six years: three years prior to and three years after treatment entry. Using survival analysis and repeated measure General Linear Models (rmGLM), the two treatment groups were compared on number of arrests, type of offence, and severity of offence. Moderator analyses looking at age, disruptive behaviour disorders, history of crimes, family functioning, and (severe) cannabis use were conducted (rmGLM).

Results

While police arrest rates increased in the three years before treatment, the rates decreased substantially after the start of both treatments. No differences were found between the treatment groups with respect to either time to first offence from the start of the treatment or changes in frequency or severity of offending over time. A treatment effect trend favouring MDFT was found for property offending in the subgroup of adolescents with high baseline-severity of cannabis use.

Conclusions

Across a follow-up period of three years, MDFT and CBT were similarly effective in reducing delinquency in adolescents with a cannabis use disorder.

INTRODUCTION

In adolescence, substance use disorder (SUD) is often part of multi-problem behaviour, characterised by comorbid delinquency, truancy, and (other) psychopathology (Griffith-Lendering et al., 2011; Skeer et al., 2009). The co-occurrence of SUD and delinquency is particularly common (Copeland & Swift, 2009; Fallu et al., 2014; Y.-I. Hser et al., 2001; Husler et al., 2005). While substance use (disorder) is a risk factor for criminal offending (Mulder, Brand, Bullens, & Van Marle, 2011). Conversely, delinquency is a risk factor for the development of SUD (Moffitt et al., 2002). Because of the interrelatedness between the two conditions, clinicians and researchers have investigated treatments which aim to target both substance use disorders and delinquency.

Treatments addressing multiple behavioural problems of youth are likely to be more effective on any therapy outcome than treatments targeting a single problem (Bonta & Andrews, 2007; Whitmore & Riggs, 2006). Of the individual (adolescent-focused) treatments, Cognitive Behavioural Therapy (CBT) has been examined most often. Systematic reviews and meta-analyses have revealed the potential of both treatments to reduce substance use (disorder) and delinquency simultaneously (Baldwin et al., 2012; Von Sydow et al., 2013; H.B. Waldron & C.W. Turner, 2008). Family therapies and cognitive behavioural therapy (CBT) have been examined most thoroughly in this respect. The meta-analysis of Baldwin (2012) reports a slightly larger effect for family therapies like multidimensional family therapy (MDFT) compared to other therapies (including CBT) on delinquency and substance use reduction. In sum, looking at the literature, both CBT and MDFT seem to be able to address multiple-problem behaviours, like SUD and delinquency (Carr, 2009).

Crucial for the success of treatments in decreasing criminal offending is the capacity to target specific risk factors associated with (the development of) delinquency of the youth (Loeber, 1990). The Risk Need Responsivity Model (RNR) states that besides levelling the intensity of treatment to the risk of re-offending (the risk principle), it is important to assess the criminogenic needs of an offender and to match the cognitive

ability, motivation and learning style of the offender with the treatment (Andrews et al., 2006, 2011; Bonta & Andrews, 2007). Several studies revealed good results for both MDFT and CBT (Hendriks et al., 2011), sometimes favouring MDFT (Dakof et al., 2015; Liddle, Dakof, Henderson, & Rowe, 2011; Liddle et al., 2009; Van der Pol, Hoeve, et al., 2017), in the reduction of short-term criminal behaviour. To examine which treatment works best for which adolescent in decreasing long-term criminal offending, comparing MDFT and CBT can generate important insights.

In criminological research, both self-reported criminality data and official crime records are used to identify and monitor delinquency. While the use of self-report data is common and accepted as a valid measure of crime reduction, reductions of official crime levels are often used as markers of effectiveness of forensic interventions by policy makers in order to adapt or change policies. Self-report data may be biased, with respondents holding back on confessing all transgressions of the law. On the other hand, self-report may invite respondents to also report criminal offences that went unnoticed to police and justice authorities. Database crime records may be more objective, but are often far from complete (Kirk, 2006). In the studies cited, the effect of treatment on delinquency was assessed from adolescents' self-report of criminal offences committed, with exception of Dakof et al. (2015), who collected crime data from registries to complement the self-reports from the studied participants. Therefore, investigating a longer follow up period of official police arrest data should reveal complementary information about possible desistence or durability of criminal offending.

The present study extends a previous randomised controlled trial conducted by Hendriks et al. (2011) on the potential of MDFT and CBT to decrease the rate of cannabis use disorder (CUD) in adolescents. In the current study, the long-term effects on delinquency of the two treatments are investigated by analysing the police arrest records of the participants. The first aim was to evaluate the development of criminal offending for the studied adolescents with a CUD, and to compare the long-term effectiveness of MDFT and CBT in reducing delinquency. The second aim was to investigate whether baseline characteristics of the adolescent differentially predicted treatment effect – reduction of registered arrests –

in MDFT and CBT. We hypothesised that both treatments would reduce criminal offending while subgroups with high prevalence of CD/ODD, or high-severity CUD/SUD, would benefit more from MDFT than from CBT.

METHOD

Sample

Table 1 lists several demographic characteristics of the population. As established earlier, these characteristics (except for drug offences) did not differ between the two treatment groups (Hendriks et al., 2011). The study included 109 Dutch adolescents, mostly boys (80%), between 13 and 18 years of age (mean age16.8 years [SD 1.3]). The majority (72%) was of Dutch or another Western ethnicity (Table 1). All participants were diagnosed with DSM-IV cannabis abuse or dependence and 66% had a criminal arrest history (one or multiple arrests) at the start of treatment. The sample of this study was enrolled in a Dutch randomised controlled trial, which was conducted as part of a transnational trial (Germany, France, Belgium, Switzerland, and the Netherlands) comparing the effectiveness of MDFT and treatment as usual (TAU) in adolescents with a CUD, i.e. the INCANT study (Rigter et al., 2010). Treatment as usual was individual psychotherapy, which was CBT in the Netherlands. The trial in The Netherlands was approved by the medical-ethical committee for research in mental health care settings of The Netherlands (METiGG; registration nr. 5238). Per adolescent at least one (step)parent or legal guardian participated in the trial. All adolescents and parents provided written informed consent to join the study. Most adolescents (73%) were referred to the study's treatment centres by mental health and youth care professionals from other treatment facilities; 19% were referred by Justice authorities, usually a youth probation officer. 8% were self-referred or referred by family or other acquaintances (Phan et al., 2011). Adolescents were barred from the study if they were currently psychotic (DSM-IV), suicidal or mentally retarded (clinical judgment), needed inpatient or opioid substitution treatment (clinical judgment), lived outside the catchment area of the treatment centre, or insufficiently understood the Dutch language (Hendriks et al., 2011).

Table 1. Baseline characteristics of study sample.

	MDFT (n = 55) Mean (SD)/%	CBT (n = 54) Mean (SD)/%	Total sample (n = 109) Mean (SD)/%
Demographic background			
Age (range 13-18 years) (years)	16.6 (1.3)	16.9 (1.2)	16.8 (1.3)
Gender male (%)	80.0%	79.6%	79.8%
Ethnicity Dutch/western (%)	72.7%	70.4%	71.6%
Delinquency[a]			
Total offences (%)	72.7%	59.3%	66.1%
Misdemeanour offences (%)	10.9%	11.1%	11.0%
Drug offences[b] (%)	0.0%	7.4%	3.7%
Vandalism (%)	23.6%	18.5%	21.1%
Property offences (%)	45.5%	42.6%	44.0%
Violent offences[c] (%)	45.5%	50.0%	47.7%
Sexual offences (%)	1.8%	0.0%	0.9%
(attempted) Manslaughter (%)	5.5%	1.9%	3.7%
Arson (%)	0.0%	1.9%	0.9%
(attempted) Murder (%)	0.0%	0.0%	0.0%
Ever in prison (%)	42.6%	37.0%	39.8%
Sum severity score[d] (SD)	17.4 (19.9)	15.4 (16.9)	16.4 (18.4)
DSM-IV diagnosis (past year)			
Conduct disorder (CD) (%)	34.8%	22.9%	28.7%
Oppositional defiant disorder (ODD) (%)	19.6%	14.9%	17.2%
CD and/or ODD (%)	43.5%	31.9%	37.6%

MDFT, multidimensional family therapy; CBT, cognitive behavioural therapy; SD, standard deviation; n = number.

[a] Offences committed before start of the treatment, as inferred from police arrest data.

[b] Moderate, sizable and serious violent offences are included.

[c] Significant difference $p<0.01$, all other measures no significant differences.

[d] Frequency of offences x severity score of offence using the BOOG-scale.

Treatment sites

Treatment sites were Parnassia Brijder (Mistral unit) and De Jutters (Palmhuis unit), both serving the city of The Hague and the surrounding region. Parnassia Brijder offers outpatient, inpatient, and rehabilitation-oriented addiction care; the Mistral unit is specialized in outpatient care for youths. De Jutters is a child and adolescent treatment agency; Palmhuis offers outpatient care to youths with a variety of problem behaviour, including addiction and delinquency.

Treatments

MDFT was delivered by 12 MDFT certified therapists who were part of one of two adjoined teams, with two therapists additionally serving as team supervisors. Manualised MDFT offered sessions scheduled twice a week on average. Sessions were held in roughly equal proportion with the adolescent, parent(s), and family (adolescent + parent(s) = family session), respectively, and furthermore with representatives of other systems (school, work, friends, agencies) present. Sessions could take place at the office, but also at the family's home or any other convenient location. Scheduling sessions was not limited to regular office hours. The two MDFT teams met once a week to discuss cases and issues.

The comparison treatment (the treatment as usual) was CBT. CBT was carried out by the same treatment centres offering MDFT, but procedurally separated to avoid 'contamination' of therapists and participants between the experimental and control conditions. The 14 CBT trained therapists worked as a team, supervised by an outside expert. CBT included sessions with the adolescent, but not with parents and families, held on average once every two weeks. Procedures about assessments, urine testing, medication, consultation of other professionals were the same as for MDFT. CBT, like MDFT, started out with treatment engagement interventions and offered psycho-education: informing the adolescent about drugs, delinquency, the maturing of the brain, situations eliciting problem behaviour, the influence of peers, and the importance of protective factors. Sessions were held in the office of the therapist.

Procedures

In the trial, the recruited adolescents (N = 109) were randomly assigned to outpatient MDFT (N=55) or outpatient CBT (N=54)). Independent certified assessors – MSc and PhD students from the University of Miami – rated MDFT treatment integrity applying the validated MDFT Treatment Adherence Scale to video recordings of mid-treatment family sessions (Rowe et al., 2013). This scale could not be applied to CBT, as there were no family sessions in this treatment condition. In the CBT condition treatment integrity was monitored through training and supervising therapists in CBT (Hendriks et al., 2011; Rowe et al., 2013). Both treatments had a planned duration of 6 months. The last follow-up assessment was scheduled at 12 months after baseline (Hendriks et al., 2011). With permission of the WODC – the research institute of the Ministry of Security and Justice of the Netherlands –, we retrieved the police arrest records from the National Police Information Services database (IPOL) for all 109 adolescents for a time period of six years: three years preceding treatment-entry in the trial and three years after the start of the treatment. One MDFT case and 7 CBT cases did not start with the assigned treatment (treatment drop-out). As for study drop-out, there was no loss of cases, in any follow-up year. Figure 1 shows the flow diagram for the study reported here.

Assessments: criminal offences

Offences were classified and severity was scored using the Dutch BOOG scale (Mulder, Brand, Bullens, & Van Marle, 2010). The Boog scale classifies specific law codes into a 12-degree severity index as follows: (1) misdemeanour; (2) drug offence; (3) vandalism; (4) property offence; (5-7) moderate, sizable or serious violent offence; (8) sexual offence; (9) pedosexual offence; (10) (attempted) manslaughter; (11) arson; and (12) (attempted) murder. Three categories were formed for analytical purposes: total offences (all classifications of the BOOG scale, 1-12); violent offences (classifications 5-12 of the BOOG scale); and property offences (classification 4 of the BOOG scale).

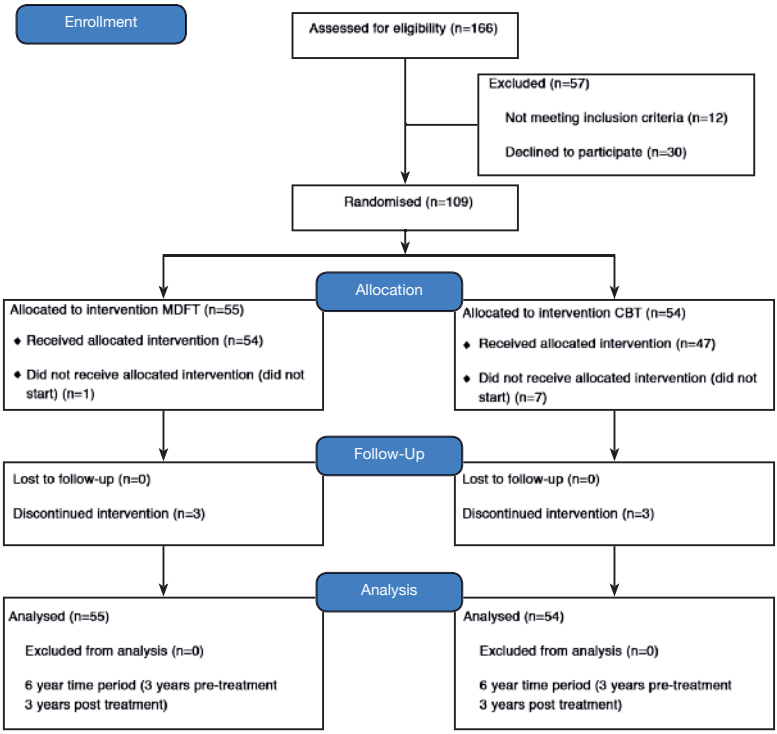

Figure 1. Study flow chart.

Assessments: cannabis use and mental health

Research assistants who were independent from the treatment staff carried out the assessments. The National Institute of Mental Health Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) was administered to determine the presence of a conduct disorder (CD) and oppositional defiant disorder (ODD) over the past year. The prevalence of these two disorders (Table 1) did not differ between the two treatment groups, nor did the prevalence of any other DSM-IV disorder (Hendriks et al., 2011).

Family functioning was assessed, using the Dutch version of the Family Environment Scale subscales Conflict (range: 0–11) and Cohesion (range: 0–11) (FES; Grotevant & Carlson, 1989; Jansma & De Coole, 1995; Moos & Moos, 1994). Cannabis consumption was measured with the Timeline Follow-Back (TLFB; Sobell & Sobell, 1992), a calendar method to collect information on the adolescent's consumption of cannabis in the 90 days preceding each assessment. Adolescents were considered to be low-severity cannabis users if they took cannabis on fewer than 65 days (the baseline median value in the trial) and high-severity users if they consumed the drug on 65 or more days. CUD (DSM-IV) at baseline was established with the Adolescent Diagnostic Interview (ADI-Light; Winters & Henly, 1993), and the Personal Experiences Inventory subscale Personal Involvement with Chemicals (range: 0–87) (PEI; Winters & Henly, 1989) was used to determine the adolescents' level of psychological involvement with substances.

Statistical analyses

Analyses were run using SPSSv21.0. The adolescents' first day of treatment was used to mark the three pre-treatment years and the three years following treatment entry. First, Kaplan-Meier survival analyses were carried out to examine how long it took for treated adolescents to be (re)arrested by the police, in which potential censoring was taken into account. Pairwise comparisons were made to identify between-group differences (MDFT vs. CBT), using the Log rank statistic. We examined group differences in police arrest and re-arrest incidence, number of offences at issue, and the type and severity of these offences across six years (the three years before treatment entry, and the three years after the start of treatment). The data for the three years before and the three years after treatment entry, respectively, were analysed with separate repeated measure General Linear Models (rmGLM) for frequency of: total offences, severity of offences, and type (property and violent offences). We assessed the three pre-treatment years for each year separately, and we did the same for the three consecutive years following the start of the treatment. The time interval chunks were analysed as a within-subject variable, and treatment as a between-subjects variable.

Moderator analyses were performed to evaluate second-order interactions: age (both continuous and categorical: 13-16 versus 17-18), disruptive behaviour disorder status (CD and ODD), history of crimes, family functioning, severe cannabis use, and severe psychological involvement with substance use. To account for any violation of sphericity, we applied Huynh-Feldt-corrected estimates if $\sum \geq 0.75$, and Greenhouse-Geisser correction if $\sum < 0.75$ in rmGLM analyses (Girden, 1992).

RESULTS

Time to first registered offence

Kaplan-Meier survival curve analysis (Figure 2) yielded no difference between MDFT and CBT (category: total offence) in time to first registered arrest since the start of treatment (log rank test $\chi^2_{(1, N = 109)} = 0.02$, $p = 0.89$).

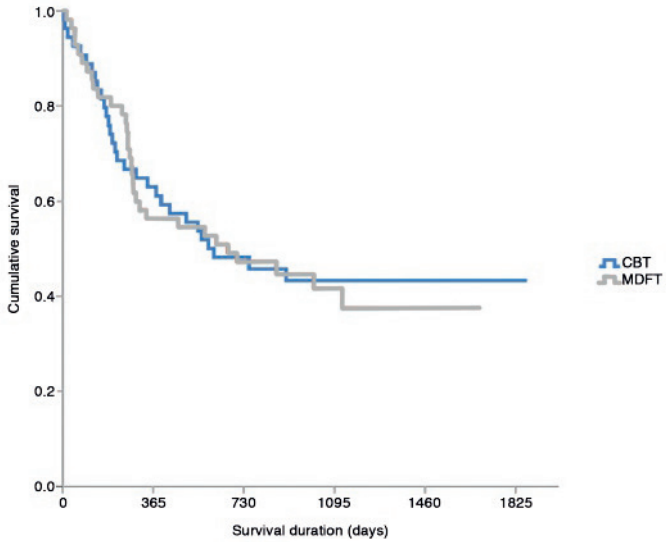

Figure 2. Kaplan-Meier survival curves, showing the duration until first registered offence after the start of treatment in MDFT and CBT. Abbreviations: MDFT = Multidimensional Family Therapy; CBT = Cognitive Behavioural Therapy.

Change in frequency over time: total number of offences and the severity of offences

Figure 3 depicts, the total number of police-arrest offences increased in the pre-treatment years and decreased thereafter. For the pre-treatment period, rmGLM analyses showed that the total offences score rose linearly before treatment was initiated in both groups, in terms of offence frequency (time: Huynh-Feldt $F_{1.7,178.5}$=16.9, p<0.001, η^2=0.14; linear $F_{1,107}$=32.1, p<0.001, η^2=0.23), and offence severity (time: Huynh-Feldt $F_{1.6,175.6}$=14.1, p<0.001, η^2=0.12; linear $F_{1,107}$=29.5, p<0.001, η^2=0.22).

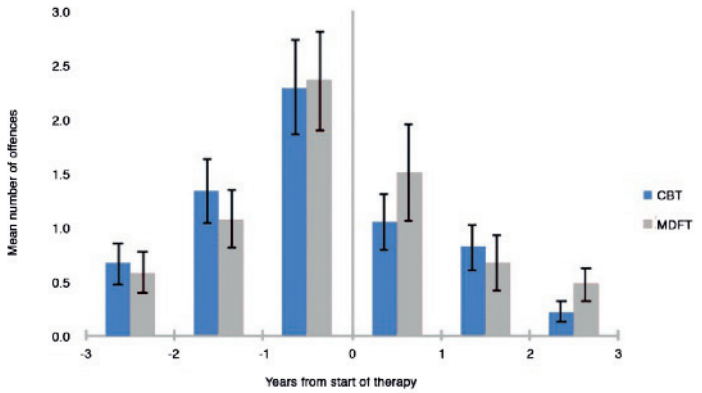

Figure 3. Mean number of offences per year from the start of therapy in CBT and MDFT. Abbreviations: CBT = Cognitive Behavioural Therapy; MDFT = Multidimensional Family Therapy.

Change in frequency over time: violent offences and property offences

Before treatment. For police-arrest registered violent offences, the same pattern of increase of pre-treatment arrests was seen in both groups (time: Huynh-Feldt $F_{1.8,195.0}$=8.1, p=0.001, η^2=0.07; linear $F_{1,107}$=18.7, p<0.001, η^2=0.15), without between-subjects (all p≥0.57) or interaction effects (all p≥0.20). For property offences, a similar linear increase in pre-treatment arrest rates was found (time: Huynh-Feldt $F_{1.7,178.2}$=7.8, p=0.001, η^2=0.07; linear $F_{1,107}$=15.0, p<0.001, η^2=0.12).

After treatment entry. In the three years after treatment entry, the police-arrest rate of violent offences dropped linearly and steeply (Huynh-Feldt; linear $F_{1,107}$=19.5, p<0.0001, η^2=0.15). The same was true of the rate of property offences (Greenhouse-Geisser; linear $F_{1,107}$=23,6, p<0.0001, η^2=0.18). There was no main effect of treatment group and of treatment group by time interaction for violent offence frequency (p>0.54). With respect to property offending, there was a statistical trend towards a main effect of treatment group, with slightly higher model intercepts in the MDFT group compared to CBT ($F_{1,107}$=3.4, p=0.07, η^2=0.03; MDFT, 1.9 (SD 4.0) vs. CBT, 0.8 (SD 1.5), $t_{69.4}$=1.8, p=0.07). However, there was no treatment group by time interaction, i.e. treatment groups did not differ significantly with respect to the decrease in property offending (p=0.84). See figure 4 (violent offences) and figure 5 (property offences).

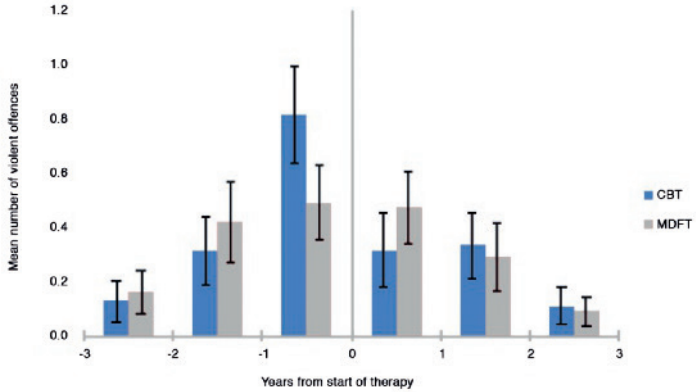

Figure 4. Mean number of violent offences per year from the start of therapy in CBT and MDFT. Abbreviations: CBT = Cognitive Behavioural Therapy; MDFT = Multidimensional Family Therapy.

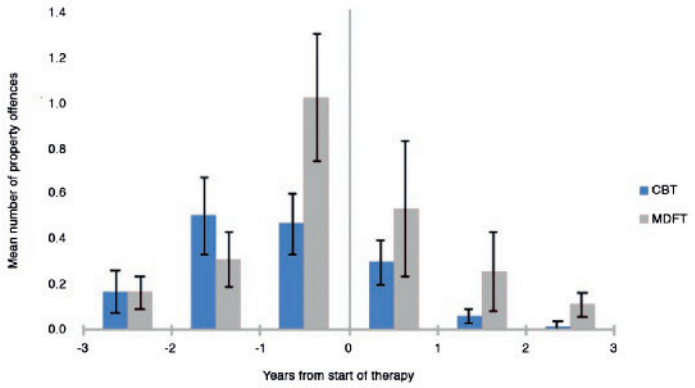

Figure 5. Mean number of property offences per year from the start of therapy in CBT and MDFT. Abbreviations: CBT = Cognitive Behavioural Therapy; MDFT = Multidimensional Family Therapy.

Baseline predictors of differential treatment effect

Second-order interaction analyses were carried out to assess if MDFT and CBT differed in reducing police arrest rates when considering baseline characteristics, i.e., age, the presence of conduct disorder or oppositional defiance disorder, crime history, family functioning. All these variables had no effect on crime offending measures in any of the two groups (all $p>0.16$). Baseline severity of cannabis use did not affect treatment response on any measure (all $p>0.20$), except for a trend-level three-way interaction with respect to property offending (time*treatment*cannabis use: $F_{1.7,184.8}=3.1$, $p=0.056$, $\eta^2=0.028$). While there was no differential treatment effect in low cannabis using youths (time*treatment $p=0.48$), there was a trend towards a steeper decrease in property offending in the MDFT group than in the CBT group in youths with severe cannabis use at baseline (time*treatment $F_{1.2,64.8}=3.5$, $p=0.056$, $\eta^2=0.06$), accompanied by a trend towards a main effect of treatment group ($F_{1,52}=3.8$, $p=0.057$, $\eta^2=0.07$). Inspection of the data indicated that this finding seemed mainly driven by a higher initial level of property offending in the MDFT group compared to the CBT group in high cannabis-using youths (MDFT: 1.6, SD 2.6 vs. CBT: 0.4, SD 0.9), with no differences after treatment (MDFT

vs. CBT year 1: 0.2, SD 0.5 vs. 0.2, SD 0.5; year 2: 0.1, SD 0.6 vs. 0.0, SD 0.2; year 3: 0.1, SD 0.4, CBT 0.0, SD 0.0).

DISCUSSION

The purpose of this study was to evaluate the long-term impact of treatment on the course of delinquency and to compare the effect of MDFT and CBT on registered police arrest of adolescents with a cannabis use disorder. Additionally, we examined if baseline characteristics of the adolescents predicted possible differential treatment outcomes of MDFT and CBT. We assumed that both MDFT and CBT would reduce the rate for criminal offending, with MDFT achieving better results in high-severe subgroups.

Across the three years before the therapy began, the rate of criminal offences increased steeply in the study sample. After treatment entry, the rate of criminal offences and the severity of offences declined sharply, to almost zero levels after three years. This drop was observed for all our offence measures, and in both groups to the same extent for all offences together, for severity of offences, and for the categories of violent and property offences, respectively. Moderator analyses indicated that pre-treatment patient characteristics (age, disruptive behaviour disorder (CD and/or ODD), history of crimes, and family functioning) did not predict differential treatment effect in MDFT and CBT. Only a trend was found in favour of MDFT with respect to decrease in property offences in the subgroup of adolescents with high baseline-severity of cannabis use.

The observed steep decrease of police arrests were found in the most turbulent period of youth, in which the rates for both prevalence and incidence of crime are highest (Moffitt, 1993). During this period, the implementation of treatments is considered to be a necessity to prevent possible future persisting criminal activity (Farrington, Coid, & Blumstein, 2003). One might assume that the initial increase and subsequent decrease in criminal behaviour observed in the current study reflect a natural pattern of desistence in late adolescence (Farrington, 1986). This

is unlikely, however, as both 13-16 and 17-18-year olds in this study showed a similar strong decrease in criminal activity after the start of the treatment. In addition, it is unlikely that some general trend among all youth in the Netherlands could explain the marked drops in offending measures that were noted in the present study, because for the years covered by our study, national statistics in the Netherlands showed no corresponding decline in arrest rates for all delinquent adolescents in the general population (Van der Laan, Goudriaan, & Weijters, 2014).

Contrary to the findings of previous studies that investigated externalising problem behaviour (Schaub et al. (2014), or criminal behaviour (Dakof et al., 2015; Liddle et al., 2011; Liddle et al., 2009; Van der Pol, Henderson, Hendriks, Schaub, & Rigter, 2017), which showed superior results for MDFT, no significant differences between MDFT and CBT were found in the current study. A potential reason could be the use of official crime records, which have a high "dark number" (only detected crimes are recorded), which underrate the actual criminal activity of an adolescent, creating possible bias (Kirk, 2006; Maxfield, Weiler, & Widom, 2000). The possible impact of treatments on criminal behaviour could therefore be underestimated.

Former studies looking at cannabis use (C.E. Henderson et al., 2010; Hendriks et al., 2011), criminal behaviour (Dakof et al., 2015; Liddle et al., 2011; Liddle et al., 2009), and a recent meta-analysis of Van der Pol et al. (Van der Pol, Hoeve, et al., 2017) analysing multiple outcome measures, found indications of the existence of the "severity gradient"– the higher effectiveness of MDFT compared to CBT and other treatments in severe cannabis/substance using adolescents –. Therefore, it could be expected that MDFT, would yield better results in specific high-risk groups. The results in this study contrast this hypothesis. A possible explanation could be the rather small size of the treatment groups (total N=109; MDFT=55, CBT=54), for conducting moderator analyses (i.e. the study was relatively underpowered to detect small effect size differences). A recent study that was conducted (Van der Pol et al., 2017), investigating self-report criminal behaviour for a larger group of 169 adolescents, support this possible explanation, because indications for the "severity gradient" were reported in this study.

One of the assets of the present study was its long time-span (six years), both before and after treatment, presenting a comprehensive overview of the development of criminal behaviour across the major part of adolescence. Our data provide the urgently needed across-years perspective, which was lacking in previous studies. Another strength of this study is the use of a randomised control trial design, which is considered to be the most robust design and best equipped to handle threats to a study's internal validity (Weisburd et al., 2001; Welsh et al., 2011). Furthermore, this study is the first in Europe comparing adolescents receiving MDFT or CBT with respect to official crime records, providing an addition to the evidence base stemming from the United States. A final asset is the low study drop-out rate, both in our earlier study focusing on cannabis use outcomes (Rigter et al., 2013) and in the present study, with 0% study drop-out.

Some limitations must be mentioned. The sample (109 adolescents) was rather small, although big enough to demonstrate treatment effects in another investigation (Hendriks et al., 2011). Our self-report study included a larger sample: not only the Dutch but also the Swiss INCANT cohort. Of all INCANT cohorts (from five countries), the Dutch one was possibly among the least impaired, with relatively low levels of cannabis dependence and alcohol use disorder (Rigter et al., 2013). As discussed, impairment level (severity of cannabis (ab)use) has been found to modify treatment responses. A limitation, too, was the absence of a third treatment group, viz., adolescents receiving no treatment at all. We did not include such a group, as withholding youths an effective treatment would have been unethical.

For future research, we suggest to investigate large groups of adolescents, looking at both self-report questionnaires and official crime records longitudinally, to gain a more comprehensive insight for this complex group of adolescents. Furthermore, we suggest further disentanglement of the underlying mechanisms of criminal behaviour, which didn't fit in the scope of this study. For example, different risk profiles (compare adolescents with one or combinations of multiple risk factors) could give more direction for future research and make it possible to further explore the possible differences of effectiveness of evidence-based treatments

targeting delinquency (Mulder et al., 2011; Mulder et al., 2012). Moreover, studying a more persisting group of delinquent adolescents could be beneficial for identifying risk factors and possible outcome measures related with reduction of criminal behaviour.

CONCLUSIONS

With trials conducted at American and European sites, using self-report and registry data, it is safe to conclude that both MDFT and CBT are evidence-based treatments not only for substance abusing but also for delinquent adolescents. By not clearly showing that MDFT is superior to CBT in achieving behavioural change, the present study is somewhat at variance with earlier studies, but the ability of both examined treatments to lastingly reduce criminal offending rates to almost zero levels is nevertheless in line with the results of earlier studies. The outcomes of a series of studies, within and outside INCANT, suggest that MDFT and CBT are equally effective in reducing crime rates in mildly impaired adolescents, however defined. MDFT is to be preferred when the impairment, e.g., cannabis (ab)use severity level, is relatively large. The final choice of treatment may be dictated by cost considerations. Although the initial cost of MDFT are higher than CBT. A cost-effectiveness analysis targeting both personal, medical, and social costs of varied adolescent problem behaviours in relation to treatment, for the same population of adolescents featuring in the present study, found MDFT to be slightly more cost-effective than CBT (Goorden, Van Der Schee, Hendriks, & Hakkaart-van Roijen, 2016).

6

ASSESSING THE EFFECT OF MULTIDIMENSIONAL FAMILY THERAPY IN ADOLESCENTS ON POLICE ARRESTS AGAINST A BACKGROUND OF FALLING CRIME RATES. A RANDOMISED CONTROLLED TRIAL WITH 7 YEARS FOLLOW-UP

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Submitted

ABSTRACT

Introduction

Multidimensional family therapy (MDFT) reduced criminal offending in adolescents in trials that used self-report for data collection. MDFT generally outperformed cognitive behavioural therapy (CBT) in these studies. In a previous study analysing police arrest data with a 3 years follow-up after treatment entry it was conclude that MDFT and CBT were effective in decreasing criminal offending. No unequivocally difference between MDFT and CBT was established. We expanded our dataset, extending the follow-up period to 7 years, to try to parcel out a treatment effect and to investigate if the dropped arrest rates could be retained.

Method

Study participants were the 109 youths from The Hague and surrounding area in the Netherlands who took part in INCANT, a trial in five West-European countries targeting adolescents with cannabis use disorder, frequently combined with criminal offending. For these youths, Dutch police registry records were searched for the 3 years before the adolescents entered randomly allocated 6-months' treatment with MDFT or CBT, and the 7 years after treatment entry.

Results

The achieved decrease in police arrest rates was retained for 7 years and dropped to almost zero level in both the MDFT and CBT groups. The two groups did not differ in reducing the total number of criminal offences and the number of violent and property crimes.

Conclusions

In a follow-up period of 7 years, police arrest rates dropped sharply in the first 3 years after the MDFT or CBT treatment episode started, to remain low and similar in the next 4 years. This was probably based on a treatment effect, but with crimes rates decreasing in the general population, this conclusion remains disputable.

INTRODUCTION

Multidimensional Family Therapy (MDFT) is a comprehensive evidence-based treatment programme for improving both substance abuse and criminal offending outcomes in diverse adolescent populations and treatment delivery settings (Galanter et al., 2014; Liddle, 2010; Van der Pol, Hoeve, et al., 2017). In most randomised controlled treatment trials, MDFT was pitched against effective 'treatments as usual', including cognitive behavioural therapy (CBT). MDFT generally outperformed CBT (Dakof et al., 2015; Liddle et al., 2011; Liddle et al., 2009; Rigter et al., 2013; Van der Pol, Hoeve, et al., 2017), although an exception – equivalence of treatments – has been noted (Hendriks et al., 2011).

In the studies cited, the effect of treatment on criminal behaviour was assessed from adolescents' self-reports of the crimes they had committed, apart from Dakof et al. (2015), who collected crime data from registries to complement the study participants' self-reports. The literature disagrees about the validity of self-reported criminal offences. Self-report data may be biased, with respondents holding back on confessing all transgressions of the law. On the other hand, self-report may invite respondents to also mention criminal offences that went unnoticed to police and justice authorities (Kirk, 2006). The alternative source of information, crime registries, may yield more objective information, but these databases often are incomplete (Kirk, 2006).

To compare the two forms of assessing the prevalence of criminal offending – self-report and registry –, we first carried out a self-report study among the Dutch and Swiss adolescents from the transnational INCANT trial (International Cannabis Need of Treatment study) (Van der Pol, Henderson, et al., 2017). We followed these youths for 1 year after baseline, i.e., from the moment they entered randomly allocated treatment with either MDFT or the comparison treatment (CBT in The Hague, the Netherlands; less structured individual psychotherapy in Geneva, Switzerland). Half of all these adolescents said they had committed one or more criminal offences in the 90 days before the baseline assessment. The proportion reporting to be non-delinquent in chunks of 90 days rose

in the year after treatment entry, most so in the MDFT group. Furthermore, MDFT outperformed comparison therapy in reducing the number of violent offences among adolescents who reported a criminal offence history at baseline (Van der Pol, Henderson, et al., 2017).

Next, we analysed registry data from the national police arrests database in the Netherlands. Subjects were the Dutch adolescents from INCANT. For these youths, arrest data were retrieved for the 3 years preceding and the 3 years following treatment entry. The number of police arrests rose in the 3 years before treatment was initiated and dropped sharply in the 3 years thereafter, with no difference seen between MDFT and CBT in the follow-up period, possibly with exception of a property crime measure (Van der Pol et al., 2018)

The similarity in dropping police arrest curves for MDFT and CBT in the registry study suggests that the two treatments were equally effective in decreasing criminal offending on this measure. However, at about the time we recruited the adolescents for the INCANT trial (2007-2010), police-records based crime rates started to fall among adolescents in the general population of the Netherlands and other European countries (De Waard, 2017; Van der Laan et al., 2014). This general decline in criminal offending rate continued to at least 2017 as far as Dutch adolescents were concerned (De Waard, 2017). Although the decrease in general crime rates was not as strong as the found decrease of crime rates in the Dutch INCANT sample (Van der Pol et al., 2018), the development in general crime statistics complicates the assessment of treatment effects on criminal offending in youths.

Thus, we looked for ways to separate a potential treatment effect from a general population decrease in crime rates. Additionally, we wanted to investigate if the achieved low levels of arrest rates could be retained longitudinally. We concluded that we needed to collect additional information from our randomised controlled trial (RCT), i.e., INCANT, as a difference in crime offence rate between two RCT treatment conditions would be proof of a treatment effect, no matter how crime rates would develop in the general population. The self-report study yielded evidence that MDFT and CBT differed in treatment effect (Van der Pol, Henderson,

et al., 2017). This was not clearly confirmed in the registry study with 3 years' follow-up, but the two treatment groups tended to diverge on one of the crime offence measures (Van der Pol et al., 2018). We reasoned that amassing more data from the trial would increase the odds of establishing a difference between the two treatment conditions. Therefore, we decided to extend our comparison of MDFT and CBT in the Dutch INCANT adolescents from 3 to 7 years follow-up.

METHOD

Sample

The study included 109 adolescents from The Hague and the surrounding region in the Netherlands. All had a DSM-IV cannabis use disorder. They were between 13 and 18 years old (mean age16.8 years). Eight in ten were boys. Seven in ten were of Dutch or another Western ethnicity. At the time of treatment entry, 66% had a police arrest history and 38% had a disruptive behaviour disorder; conduct disorder (CD) and/or oppositional defiant disorder (ODD). For more information about the sample see Van der Pol et al. (2018). The adolescents concerned were enrolled in the transnational INCANT trial. INCANT compared the effectiveness of MDFT and treatment as usual – CBT in The Hague – to reduce cannabis use and the prevalence of cannabis use disorder (Rigter et al., 2010). Apart from not meeting the broad inclusion criteria, adolescents were only excluded from the study if needing inpatient treatment (Rigter et al., 2010). Treatment sites were Parnassia Brijder (Mistral unit; addiction care) and De Jutters (Palmhuis unit; forensic care).

Procedures

The Dutch INCANT adolescents were randomly assigned to 6 months of either outpatient MDFT or outpatient CBT. MDFT comprised sessions with the adolescent, the parents, and the family (youth plus parents), respectively, whereas CBT offered sessions just with the adolescent, not with the parents. To assess treatment integrity, MDFT family session recordings were rated by independent observers for adherence to MDFT

principles using a validated scale (Rowe et al., 2013). In CBT, treatment integrity was monitored through training and supervising CBT therapists (Hendriks et al., 2011).

At our request, the research and research management institute of the Ministry of Security and Justice of the Netherlands, the WODC, retrieved police arrest (with summons) records from the National Police Information Services database (IPOL) for all 109 adolescents for a period of 10 years, running from the 3 years preceding the study treatment through 7 years thereafter. For the flow diagram of the study, see van der Pol et al (2018). Only one of the 109 adolescents dropped out from the trial during the follow-up period.

Measurements: criminal offences

We categorised offences as violent crimes (aggression, violent sexual offences, violent property offences), property crimes, and other. The Dutch BOOG scale was used to score offence severity (Mulder et al., 2010). This scale converts law codes into a 12-degree severity index, i.e., (1) misdemeanour; (2) drug offence; (3) vandalism; (4) property offence; (5-7) moderate, sizable or serious violent offence; (8) sexual offence; (9) child sexual offence; (10) (attempted) manslaughter; (11) arson; and (12) (attempted) murder. To calculate a severity score for an adolescent, we multiplied for each year the registered crime(s) with the severity score of the crime(s). These time period ("time chunks") severity scores were used to analyse the crime trajectories of the adolescents.

Measurements: cannabis use

To record the frequency of consumption of cannabis we applied the Timeline Follow-Back (TLFB; Sobell & Sobell, 1992), a calendar method to collect information on the adolescents' use of cannabis in the 90 days before each assessment (Sobell & Sobell, 1992). Adolescents were classified as low-severity cannabis users if they took cannabis on fewer than 65 days (the baseline median value in the trial), and as high-severity users if they took the drug on 65 or more days. We delivered the Adolescent Diagnostic Interview (ADI-Light; Winters & Henly, 1993) to determine if the youth met the criteria for a cannabis use disorder.

Measurements: possible treatment modifying factors

Earlier studies suggested that some factors may alter the response to MDFT treatment. MDFT outperformed comparison therapy, including CBT, in reducing cannabis use problems especially in adolescents with a severe level of cannabis use at baseline (C.E. Henderson et al., 2010; Hendriks et al., 2011; Van der Pol, Hoeve, et al., 2017). In our present analyses, we maintained the distinction between low-severity and high-severity cannabis users (Van der Pol, Hoeve, et al., 2017). Other factors found to correlate with MDFT treatment superiority are young age of the adolescent, the presence of an externalising disorder, and the level of family functioning (Hendriks et al., 2011). To examine if these latter factors mattered in the current study as well, we first administered the National Institute of Mental Health Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV; Shaffer et al., 2000) to determine if the adolescent had conduct disorder (CD) or oppositional defiant disorder (ODD) in the year before treatment entry. We evaluated family functioning with the Dutch version of the Family Environment Scale subscales Conflict and Cohesion (Grotevant & Carlson, 1989; Jansma & De Coole, 1995; Moos & Moos, 1994)

Statistical analyses

Analyses were run with SPSSv24.0. The adolescents' first day of treatment was taken to retrospectively define the 3 pre-treatment years and the 7 years of follow-up. We carried out pairwise comparisons, with the Log rank statistic, to identify differences between the MDFT and CBT conditions. We assessed group differences in police arrests, number of arrests at issue, and the type and severity of these offences. The data for the 3 years before and the 7 years after treatment entry, respectively, were analysed with separate repeated measure General Linear Models (rmGLM) for frequency, type (violent and property offences), and severity of recorded offences. Next, each pre-treatment year and each follow-up year was entered as a separate 'chunk' in the analyses, as a within-subject variable. Treatment was handled as a between-subject variable. In addition, we ran moderator analyses to examine second-order interactions: age (both continuous and categorical (13 - 16 versus 17 – 18 years), history of crimes, baseline cannabis use rate (severe versus

non-severe), presence of CD or ODD, and family functioning. To account for any departures from sphericity, we applied Huynh-Feldt-corrected estimates if $\sum \geq 0.75$, and Greenhouse-Geisser correction if $\sum < 0.75$ applied in rmGLM analyses (Girden, 1992).

RESULTS

Change in the total number of arrests

The total number of police arrests increased across the 3 pre-treatment years and decreased after treatment entry (Figure 1). According to rmGLM analyses, the number of arrests grew linearly in the pre-treatment period in both groups (time: Huynh-Feldt $F_{1.7,178.5}=16.9$, $p<0.001$, $\eta^2=0.14$; linear $F_{1,107}=32.1$, $p<0.001$, $\eta^2=0.23$). The two groups did not differ on pre-treatment delinquency increase (Huynh-Feldt $F_{1.7,178.5}=0.2$, $p=0.82$, $\eta^2=0.001$) or intercept ($F_{1,107}=0.1$, $p=0.76$, $\eta^2=0.001$). The previous desribed results were established in our previous study (Van der Pol, et al. 2018).In the 7 years of follow-up after treatment entry, the number of total offences fell to almost zero level (time: Greenhouse-Geisser $F_{3.8,403.4}=14.5$, $p<0.0001$, $\eta^2=0.12$). The decline was similar in both treatment groups (Greenhouse-Geisser $F_{3.8,403.4}=0.4$, $p=0.82$, $\eta^2=0.03$).

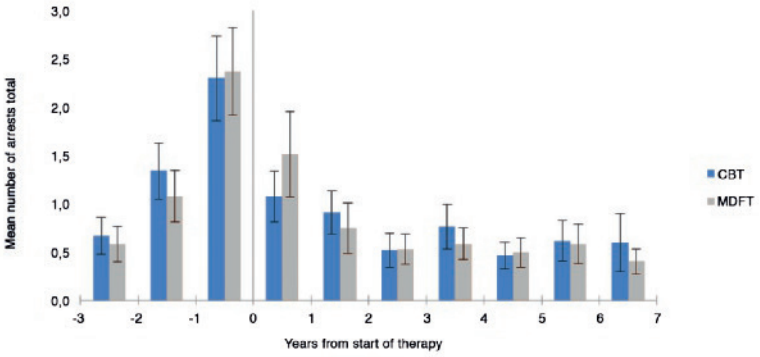

Figure 1. Mean number of arrests per year from the start of CBT or MDFT. Abbreviations: CBT = Cognitive Behavioural Therapy; MDFT = Multidimensional Family Therapy.

Change in severity of arrests

The severity of the offences increased across the three pre-treatment years, from an average severity score of 2.06 (SD 5.08) to 8.07 (SD 11.8), in both groups to the same extent (time: Huynh-Feldt $F_{1.7,178.7}$=13.9, p<0.0001, η^2=0.12, time*treatment: Huynh-Feldt $F_{1.7,178.7}$=0.11, p=0.86, η^2=0.001). Group models did not differ in their intercepts ($F_{1,107}$=0.2, p=0.65, η^2=0.002). The previous desribed results were established in our previous study (Van der Pol, et al. 2018). In the years after treatment entry, the offences became less severe (time: $F_{3.5,375.9}$=14.4, p<0.0001, η^2=0.12). The decline in severity followed a quadratic trajectory (linear: $F_{1,107}$=51.5, p<0.001, η^2=0.33; quadratic: $F_{1,107}$=20.3, p<0.001, η^2=0.16), with a severity score of 1.76 (SD 4.23) in the third year after the start of treatment, which remained low up until the seventh year after treatment 1.46 (SD 4.98), with no difference in intercept ($F_{1,107}$<0.001, p=0.99, η^2<0.001) or decline rate (Greenhouse-Geisser $F_{3.5,375.9}$=0.65, p=0.61, η^2=0.01) noted between the treatment groups.

Violent and property offences

With the same set of analyses, we targeted violent and property crimes, respectively. In the follow-up period, both types of offences dropped in number: violent (Greenhouse-Geisser $F_{4.0,25.6}$=8.3, p<0.0001, η^2=0.07); property (Greenhouse-Geisser $F_{3.2,338.2}$=4.9, p=0.002, η^2=0.04). Both violent and property offending did not follow a purely linear decrease trajectory (violence: linear $F_{1,107}$=33.4, p<0.001, η^2=0.24, quadratic $F_{1,107}$=10.4, p=0.002, η^2=0.09, 7^{th} order $F_{1,107}$=5.7, p=0.019, η^2=0.05; property: $F_{1,107}$=9.9, p=0.002, η^2=0.08, quadratic $F_{1,107}$=12.5, p=0.001, η^2=0.10): offending rates appeared to drop in the first 3 years after treatment, to remain low afterwards (Figures 2 and 3). There was no significant difference between treatment groups in decreasing the frequency of both violent (Greenhouse-Geisser $F_{4.0,425.6}$=1.6, p=0.16, η^2=0.02) and property offending (Greenhouse-Geisser $F_{3.2,338.2}$=1.8, p=0.15, η^2=0.02).

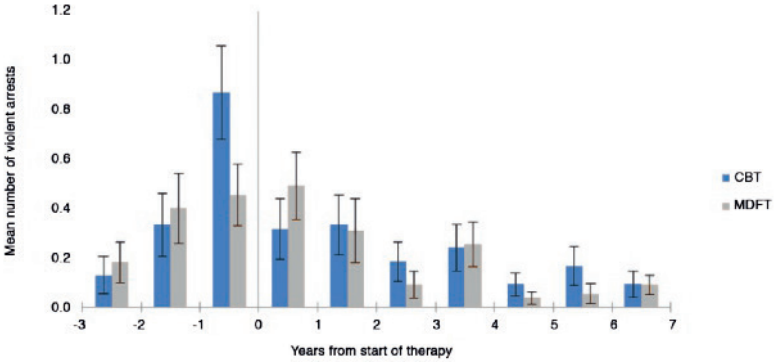

Figure 2. Mean annual number of police arrests for violent offences, from the start of CBT or MDFT treatment. Abbreviations: CBT = Cognitive Behavioural Therapy; MDFT = Multidimensional Family Therapy.

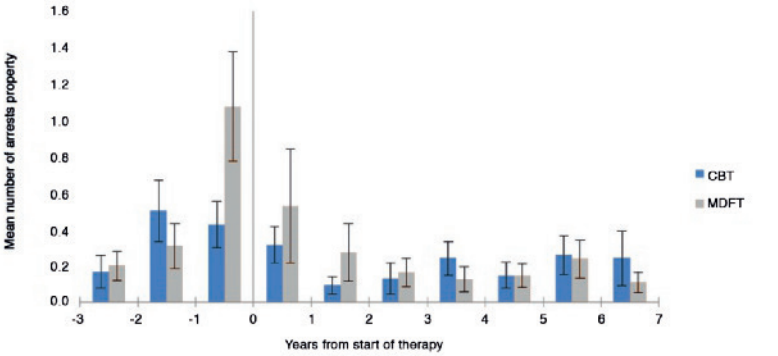

Figure 3. Mean annual number of police arrests for property offences, from the start of CBT or MDFT treatment. Abbreviations: CBT = Cognitive Behavioural Therapy; MDFT = Multidimensional Family Therapy.

Baseline predictors of a differential treatment effect

We performed second-order interaction analyses to assess if MDFT and CBT differed from each other in reducing criminal offending when pre-defined baseline characteristics were entered in the calculations: age of the adolescence, crime offence history, severity of cannabis use, a diagnosis of disruptive behaviour disorder status (oppositional defiant

disorder [ODD] and/or conduct disorder [CD]), and family functioning (Hendriks et al., 2011; Rigter et al., 2013). None of these variables influenced crime offending rates ($p>0.15$).

DISCUSSION

In our previous police arrest study, targeting the same sample of adolescents with a cannabis use disorder, the number of arrests and criminal offences dropped in the 3 years following treatment entry. The MDFT and CBT groups were both able to impressively decrease arrest rates but the two treatments did not differ on any of the outcomes, suggesting that the two therapies were equally effective (Van der Pol et al., 2018). We decided to collect more follow-up data to distinguish effectiveness between these two treatments. We here report on a follow-up period of 7 years. Both treatments not only lowered the incidence of police arrests for total, violent and property offences, but were also able to retain the low arrest rates for the adolescent for up to 7 years. Even with this larger data set, we could not establish any difference in treatment effect between the CBT and MDFT groups of adolescents.

The lack of difference between the two treatment groups might suggest that both treatments were equally effective, unlike in other RCT-based investigations where MDFT had the upper hand (Dakof et al., 2015; Liddle et al., 2011; Liddle et al., 2009; Rigter et al., 2013; Van der Pol, Hoeve, et al., 2017). However, this conclusion – there was a treatment effect – cannot be drawn with certainty, as crime offence rates fell markedly in the general population of the Netherlands during the course of our study. Crime offence rates usually increase to the age of 18, but then decline to lower levels during emerging adulthood (Hill, Blokland, & van der Geest, 2016; Moffitt, 1993). Even this observation does not rule out an (partial) effect of the decline in police arrest rates for the general population. In other words, although we prolonged the follow-up period to 7 years, which is exceptionally long, and extended the data set, we could not exclude a general population trend as a confounding factor. A methodological solution to resolve this impasse would have been to add a waiting-list

control group to the trial. This was not an option. It would have been unethical to not offer an effective therapy to youths needing treatment.

The present study relied on police arrest registry measures as a proxy of criminal offending. Using official police arrest data or self-report data have their pros and cons (Maxfield et al., 2000). Though, recent literature suggests that self-report is the best approach to establish statistically significant differences between treatment groups. In studies of another family therapy, Multisystemic Therapy (MST), MST – although weakly effective at best – scored better on self-report measures than on crime records measures (Asscher et al., 2014; Fonagy et al., 2018). Of interest, Dutch police-records based crime statistics for adolescents have dropped with roughly 40% in the past decade, while self-report crime rates decreased with only 10% (Van der Laan et al., 2014). The 40% registry measure decline falls short of the present study's 87% reduction in total police-arrest criminal offences for the combined treatment groups across the same period of time. Thus, at least part of the observed police-records based decline in criminal offending rate appears to reflect a treatment effect, for both MDFT and CBT.

The registry measure of criminal offending requires further examination. Why did the prevalence of registry-measured crime offences fall so sharply in the general population in the past decade? Perhaps, police procedures (letting young or first-time offenders walk without a booking) have changed. In addition, growing use of social media and smart phones may have kept youths away from the temptations of the street (De Waard, 2017).

A strength of the present investigation was that it was embedded in a randomised controlled trial, with the methodological advantages of this type of study design (Weisburd et al., 2001; Welsh et al., 2011). Another strong point, from a youth developmental perspective, was the long timespan of the study and especially the long duration of the follow-up period, which ranged from adolescence to early adulthood. Following RCT participants up for 7 years is rare in treatment trials.

This study should be replicated with a larger sample of adolescents, recruited for criminal offending rather than for abusing cannabis. In a replication study, follow-up periods for self-report and for registry assessments should be the same and more information should be collected on the determinants and the nature of the delinquent behaviour of the youths concerned.

CONCLUSIONS

The incidence of police arrests fell after adolescents entered 6-months' treatment with MDFT or CBT. The police arrest rate dropped sharply in the first 3 years after treatment entry and remained at close to zero levels in the next 4 years of follow-up. The MDFT and CBT groups did not differ on any measure. This might suggest that the two treatments were equally effective. An alternative explanation is that the drop in the number of police arrests was (partially) due to a general population trend of declining crime offence rates. All these conclusions bear heavily on the crime offence measure used.

7

SUMMARY AND GENERAL DISCUSSION

AIM

This dissertation aimed to identify the common elements of systemic treatments and to examine the effectiveness of Multidimensional Family Treatment (MDFT), for delinquent, substance abusing adolescents with comorbid problem behaviours. Further we aimed to investigate if baseline characteristics of the adolescent differentially influenced treatment effect. Below we summarise and discuss the main findings.

SUMMARY

In **chapter 2** the aim was to investigate, based on existing studies, the effectiveness of MDFT and to conduct extensive moderator analysis. A special aim in this chapter was to examine if adolescents with severe substance abuse and severe externalising psychopathology benefitted more from MDFT than adolescents with less severe conditions. To address the aforementioned aims, we conducted a three-level meta-analysis, using 61 effect sizes from 19 manuscripts (N = 1,488 participants). MDFT was compared to other treatments; cognitive behavioural therapy (CBT), group therapy (GT), and combined treatments (CT). The potential of MDFT to reduce adolescents' substance abuse, delinquency, externalising psychopathology, internalising psychopathology, and family malfunctioning was analysed. MDFT was more effective in the reduction of all outcome categories (d = 0.24, $p < 0.001$). An imperative finding of this study was the establishment of the "severity gradient"; adolescents with more severe problem behaviours benefitted significantly more from MDFT than from other treatments. This was found for adolescents with severe substance abuse and disruptive behaviour disorder.

In **chapter 3** the objective was to identify common elements of evidence-based systemic treatments: *treatment mechanisms, treatment parameters,* and *treatment techniques*, used in established evidence-based manualised systemic treatments for adolescents with disruptive behaviour problems: conduct disorder (CD), oppositional defiant disorder (ODD), and substance use disorders (SUD). The five systemic treatments

included were: Multi Systemic Therapy (MST), Functional Family Therapy (FFT), Multidimensional Treatment Foster Care (MTFC), Brief Strategic Family Therapy (BSFT), and MDFT. Between the five studied treatments a considerable overlap was found, suggesting a strong shared base. Six treatment mechanisms; e.g. *engagement*, *alliance*, were identified. Furthermore, four treatment parameters; *caseload, duration, educational level therapists, and therapy dosage* and 16 treatment techniques; e.g. *conflict management, communication skills, reinforcement*, were identified. When the developers of family treatments could cooperate, the identified common mechanisms and techniques could possibly be used to generate a strong universal systemic treatment protocol applicable for a broad spectrum of adolescents with problem behaviours.

Chapter 4 compares MDFT with individual psychotherapy (IP) on self-reported delinquency. Youth in the Netherlands and Switzerland were studied. The aim addressed in this chapter was analysing the effectiveness of MDFT on delinquent behaviour. Results showed that both treatments substantially lowered criminal offending among adolescents who reported to have committed crimes prior to the start of treatment. Further, more adolescents (with no self-reported criminal offending in the 90 days before the start of treatment) receiving MDFT reported to abstain from any type of criminal offence over time than corresponding IP youth (d = 0.51). When distinguishing between property and violent crimes, this favourable effect of MDFT (compared with IP) occurred pertaining to violent crimes, but not for property crimes (d = 0.43).

The first aim of **chapter 5** was to compare the long-term effectiveness of MDFT and CBT in reducing delinquency in Dutch substance abusing youths. The second aim was to investigate whether baseline characteristics of the adolescent differentially predicted treatment effect – reduction of registered arrests – in MDFT and CBT. We hypothesised that both treatments would reduce criminal offending while subgroups with high prevalence of conduct disorder and/or oppositional defiant disorder (CD/ODD), or high-severity cannabis use disorder and/or substance use disorder (CUD/SUD), would benefit more from MDFT than from CBT. While police arrest rates increased in the three years before treatment, they decreased substantially after the start of both treatments. No differences

were found between the treatment groups with respect to either time to first offence from the start of the treatment or prevalence of property and violent offending or severity of offending over time. A treatment effect trend favouring MDFT was found for property offending in the subgroup of adolescents with high baseline-severity of cannabis use. For other baseline predictors of treatment outcome, age, disruptive behaviour disorders (CD and/or ODD), history of crimes, and family functioning no difference in treatment effect was seen.

In **chapter 6** we extended the observed period of crime trajectories for participants receiving MDFT and CBT to ten years, three years prior to treatment start until seven years after treatment start. This was done to be able to study the transition into adulthood. The aim was to compare both treatments and to analyse if the treatment effects on offending retained over time. Police arrest rates dropped to almost zero in the subsequent seven years in both the MDFT and CBT groups. Both treatments were able to retain the achieved low levels of criminal offending after the end of treatment. The two groups were equally effective in reducing the total number of criminal offences and the number of violent and property offences. Extensive moderator analyses showed that none of the moderator variables influenced crime offending rates.

GENERAL DISCUSSION

This dissertation aimed to inform and give insight into: 1. the common elements of evidence-based systemic treatments; 2. the effectiveness of MDFT compared to other treatments, for delinquent, substance abusing adolescents with comorbid problem behaviours; 3. the influence of baseline characteristics of the adolescent regarding treatment effect.

Six main findings are reported in this dissertation.

First, a considerable overlap of common treatment elements (treatment mechanisms, treatment parameters, and treatment techniques) across evidence based manualised systemic treatments was found, indicating a strong common foundation (Chapter 3).

Second, several evidence-based treatments, e.g. CBT, MDFT, GT and CT, were able to reduce criminal behaviour substantially (Chapter 2, 4, 5, and 6), and were able (CBT and MDFT) to retain the achieved low levels of delinquency over a 7-year follow-up period (Chapter 6).

Third, concerning the effectiveness of systemic treatments, we established that Multidimensional Family Therapy (MDFT) yielded slightly better results than CBT, GT, and CT, in reducing delinquency, substance abuse, family problems, and psychiatric psychopathology (Chapter 2).

Fourth, MDFT seems to be best suited for the severe substance abusing adolescents with disruptive behaviour disorders. We named this finding "*the severity gradient*" (Chapter 2, 4).

Fifth, MDFT seems to render better results than IP in reducing recidivism among violent/versatile offenders (Chapter 4).

Sixth, MDFT, compared to other treatments (GT, CT, and CBT), seems to be able to better protect adolescents at risk to commit criminal offences (Chapter 2, 4).

Regarding the **first aim**: identifying the common elements of systemic treatments, a considerable overlap of treatment elements (*treatment mechanisms, treatment parameters, and treatment techniques*) across evidence based manualised systemic treatments was established in this dissertation, implying a solid joint basis. The understanding of these treatment elements is essential to derive and refine treatment strategies to improve or remove irrelevant strategies and develop novel approaches that are more expeditious and effective than current treatments (Kazdin, 2007). Knowledge of the working mechanisms could also improve precision in matching psychological treatments to the needs of individuals, thereby optimising treatment outcomes (Holmes et al., 2018). Further, looking at *treatment mechanisms*, it was found that the phasic process of systemic treatments is essential, starting with motivating and creating a foundation of change, towards implementing themes and behavioural changes, and finally sealing the changes achieved in treatment. The awareness in which phase you are is considered to be a crucial mechanism, this together with the interaction of the family members and building of positive alliances

with and between them, needs to be assessed and evaluated constantly. This overall awareness during treatment is necessary to use the proper interventions/techniques at the appropriate time, to ensure the maximum impact of the delivered interventions/techniques, and thus to be able to progress in the phasic process of change.

Critical questions which can be raised are; why are there so many different systemic treatments if their ingredients (common elements) are so similar? Further, does the systemic treatment MDFT work best for substance abusing adolescents or can other systemic treatments achieve comparable results? Therefore, systemic treatments should further clarify for which type of adolescent their treatment is most effective or developers of systemic treatments could cooperate to generate a strong universal systemic treatment applicable for a broad spectrum of adolescents with problem behaviours. To address the complex concoction of risk factors surrounding the adolescent; strategies, a conceptual framework of treatment, and timing of the deliverance of treatment technique(s) are imperative (Garland, Hawley, Brookman-Frazee, & Hurlburt, 2008; Jainchill, Hawke, & Messina, 2005). As a result, it could lead to more effective prevention and treatment programmes for adolescents with substance abuse and delinquency (Hall et al., 2016; Merikangas et al., 2010).

Considering the **second aim** of comparing the effectiveness of MDFT with other treatments (CBT, GT, and CT) the finding that all researched treatments studied in this dissertation are successful in reducing cannabis use, delinquency, family problems, externalising and internalising psychopathology corresponds with similar research, stating that systemic treatments and CBT-based treatments are the most promising in the reduction of adolescent problem behaviours (Baldwin, Christian, Berkeljon, & Shadish, 2012; A Carr, 2018; Tanner-Smith, Wilson, & Lipsey, 2013).

In general, compared to CBT-based treatments, systemic treatments seem to have a slight upper hand in the reduction of problem behaviours, e.g. substance abuse, delinquency, psychiatric psychopathology. This is in line with previous studies highlighting the surplus value of systemic-based treatments over other types of treatments (Baldwin et al., 2012; A. Carr, 2009; Van der Stouwe, Asscher, Stams, Deković, & Van der

Laan, 2014; Von Sydow, Retzlaff, Beher, Haun, & Schweitzer, 2013). The additional value of systemic treatments may be explained by the ambition to address not only risk factors at the individual level (the adolescent with his or her personality traits and response patterns), but also at the family, peers, school/work and leisure time levels. The latter factors strongly influence the behaviour of an adolescent and influence multiple problem areas (Lai, Zeng, & Chu, 2016; Leve, Chamberlain, & Kim, 2015; Wilson & Hoge, 2013), strengthening the case for systemic treatments to be implemented for adolescents with comorbid problem behaviours.

Another possible reason regarding the success of MDFT in decreasing (besides substance abuse) secondary problem behaviours; like internalising psychopathology, externalising psychopathology, family malfunctioning, and delinquency is the interrelatedness between these problem behaviours. This coexistence of a range of associated problem behaviours is characterised as "*the general deviance syndrome"* (Donovan & Jessor, 1985; Jessor & Jessor, 1977; McGee & Newcomb, 1992). Generally, the more problem behaviours youths exhibit in one area (e.g., substance abuse), the more likely they are to manifest problem behaviours in other areas (Crowley & Riggs, 1995). Thus, if MDFT is capable of successfully targeting substance abuse, a logical consequence could be that other interrelated problem behaviours diminish simultaneously.

Looking at the **third aim**, the influence of baseline characteristics of the adolescent regarding treatment effect; the described "*severity gradient*" seems to strengthen the case that systemic treatments are best equipped treatments for severely (comorbid) impaired adolescents. For the less severe impaired adolescents, more options are available to choose from to obtain risk decreasing results. This "*severity gradient*" was previously established for substance abuse (Henderson, Dakof, Greenbaum, & Liddle, 2010; Rigter et al., 2013). Moreover, Hendriks et al. found MDFT to yield better results than CBT in lowering cannabis use for adolescents with CD and/or ODD, a criminal history, and family malfunctioning (Hendriks, Van der Schee, & Blanken, 2011). The meta-analysis in this dissertation (chapter 2) found the "*severity gradient*" to be applicable for disruptive behaviour disorders (DBD) and severe cannabis use. This was not only valid for the outcome measure substance abuse, as was

found in previous research, it was also valid for the outcome measures; family malfunctioning, internalising psychopathology, externalising psychopathology, and delinquency. Further, the finding that MDFT outperforms IP in reducing recidivism among violent/versatile offenders, who are more inclined to be more severely impaired than the offenders committing property crimes (Colins, Vermeiren, Schuyten, & Broekaert, 2009; Lai et al., 2016; Mulder, Vermunt, Brand, Bullens, & Van Marle, 2012), suggest a similar pattern for adolescents with more severe types of delinquency. This finding is supported by the study of Dakof et al., who found similar results in a study looking at registered crimes (Dakof et al., 2015). Still, we have to be careful with this conclusion because for the studies with arrest data (chapter 5, 6), no difference in treatment effectiveness in delinquency was found for MDFT and CBT. Nevertheless, it seems to be crucial to consider the complexity, the heterogeneity (in symptoms across disorders, high rates of comorbidity), and the level of impairment of the adolescent, for selecting the best fitting treatment.

The possible protective effect (Chapter 2, 4), found for MDFT, for youth at risk for criminal behaviour, stresses the need for matched care as early as possible. A recent meta-analysis confirming that intervention programmes may prevent (the first incident of) criminal offending, with the most effective programmes being family-oriented and 'multimodal' (multidimensional, in MDFT's terminology) (Vries, Hoeve, Assink, Stams, & Asscher, 2015). This emphasises even more the importance of early recognition and screening of youth at risk and the use of secondary prevention programmes among high risk youths and if necessary the implementation of treatments as early as possible (at the most appropriate time to avoid stigmatisation) to protect the youth at risk and to reduce the burden on society (Moffitt, Caspi, Harrington, & Milne, 2002). The possible preventive potential of family-oriented treatments, together with the capability of systemic treatments to decrease and even to desist criminal behaviour of the adolescent, should incite policy makers to further enrol systemic treatments in juvenile justice and ambulatory settings (Dakof et al., 2015). Again, we need to be careful with this conclusion because the protective effect for MDFT was not found in our registered crime studies (Chapter 5, 6).

For our delinquency analyses in this dissertation, both self-report data and police arrest data (registered crimes) were used, both holding their pros and cons and they seem to portray the concept delinquency from a different perspective. Not surprisingly, in previous research, data from self-report compared to official crime records (arrests) were found to have low correlations (van Domburgh, Geluk, Jansen, Vermeiren, & Doreleijers, 2016). Self-report invites respondents to report criminal offences that went unnoticed to police and justice authorities. However, it is well known that delinquent adolescents have the tendency to answer in a socially desirable way, leading to less objective results (Junger-Tas, Terlouw, & Klein, 1994). Official crime records (police arrest data) are often considered the most robust and are used to inform policy makers, although they have a high "dark number" (only detected crimes are recorded), ultimately underrating the actual criminal activity of an adolescent, creating possible bias. Additionally, specific characteristics of an adolescent, unrelated to delinquent behaviour, can increase the change of being arrested by the police, which besides stigmatisation of sub-groups of adolescents leads to biased delinquency statistics (Kirk, 2006; Maxfield, Weiler, & Widom, 2000). Therefore, in this dissertation we studied both self-report and police arrest data to gain maximum insight on the influence of (systemic) treatments on delinquency.

LIMITATIONS

Some limitations must be mentioned. First, a main focus of this dissertation is to study the effectiveness of systemic treatments on delinquency. Unfortunately, the studied populations were all primarily substance abusing based samples, of whom many initially were not delinquent. Although a high percentage of the substance abusing adolescents in these samples committed crimes, pure delinquent populations/samples could have generated more insightful results. Conversely, the mixed adolescent samples gave us the opportunity to study the possible protective and/or preventive effect of treatments. Still, the generalisability of results to pure delinquent samples must be done with the upmost care.

Second, all studies in this dissertation were based on randomised control trials (RCTs). Although an RCT is considered the best research design, there are scholars postulating that due to the selection procedure of RCTs, we should be cautious to generalise the findings from experimental settings to routine youth care (Waldron & Turner, 2008). Within clinical samples, there is substantial heterogeneity in adolescent characteristics (e.g., age, substance abuse, ethnicity, delinquency, psychiatric comorbidity). Therefore, adolescent subgroups, within these clinical samples, may differ considerably in treatment outcome (Chan, Dennis, & Funk, 2008; Daudin et al., 2010).

Third, in this dissertation the emphasis was primarily on decreasing risk factors, with little emphasis on protective factors. Moreover, this dissertation is focussed on decreasing problem behaviours (delinquency, substance abuse, family malfunctioning, psychopathology). It does not study other outcomes, such as the positive impact and the change in societal participation and quality of life of the adolescent. This could have led to a more comprehensive overview of the impact of treatments on the behavioural change of the adolescents.

Fourth, a relative narrow conceptualisation of common elements in our qualitative study of evidence based systemic treatments was investigated (Lambert, 1992) as the broad conceptualisation which integrates characteristics of client, therapist relationship, and expectancy of the clients was not studied, due to a lack of information concerning these variables (Hubble, Duncan, & Miller, 1999; Sprenkle, Davis, & Lebow, 2009).

Finally, for the included, analysed studies, the country or region-specific characteristics, for example the organisation of care, differences in legislation, or the influence of other implemented treatments, were not considered, which may limit the generalisability of our results.

CLINICAL IMPLICATIONS

A practical implication derived from the dissertation is that MDFT, although suitable for a broad spectrum of adolescents with behaviour prob-

lems, may be most suitable for adolescents with severe problems, severe substance abuse, DBD, and delinquency in particular. Furthermore, this finding could indicate that other less intensive and expensive treatments, for example individual CBT, are equally or more appropriate for addressing SUD and comorbid psychopathology in adolescents with less severe problem behaviours.

A further implication for practice is that the identification in this dissertation of common elements (treatment mechanisms, treatment parameters, and treatment techniques) in evidence-based systemic treatments could accommodate the further innovation of training methods and prevention programmes. Thus, teaching therapist and health care workers, the identified treatment mechanisms and treatment techniques, could be beneficial for the adolescents and the working environment of the health care professionals. This training of common elements should not just be the deliverance of the identified common treatments techniques, but it should preferably be structured or protocolised to warrant maximum effectiveness (Garland et al., 2008). Furthermore, this innovative, universal training/treatment approach could decrease the resistance of clinicians concerning the implementation of evidence based practices (Perkins et al., 2007; Weersing & Weisz, 2002). Moreover, it could enhance the basic competencies of clinicians and increase the use of common elements in daily practice (Davis, Thomson, Oxman, & Haynes, 1992). Finally, the acquired knowledge might even be used to develop a brief, flexible, modular, efficacious, systemic treatment training or treatment, with the possibility to be implemented more universally, for example in countries with less resources and knowledge and even in low income countries.

Of note, it is essential for treatments which treat an adolescent with delinquency, substance abuse and other comorbid problem behaviours, to address the risk and/or protective factors and to take into account the needs and responsivity of the adolescent (Andrews, Bonta, & Hoge, 1990; Andrews, Bonta, & Wormith, 2006, 2011). The Risk Need Responsivity model (Andrews et al., 2006) offers a framework for treatments to further explore their applicability to address certain risk factors for specific delinquent subgroups of adolescents. As a necessary counterbalance

for the pragmatic RNR, the Good Lives Model (Ward & Gannon, 2006; Ward & Stewart, 2003) delivers complementary ideas to focus on strengths and capabilities of the adolescents and in doing so, creating better opportunities to rehabilitate. Treatments should incorporate both approaches and the developers of potential solutions for desisting delinquent behaviour should consider, both highly individualised (e.g., personalised, tailor-made) approaches and so-called universal or transdiagnostic approaches that target common mechanisms of change (Holmes et al., 2018).

A final practical implication derived from this dissertation, is that the multimodal approach (targeting risk factors as: family problems, parenting skills, peer group pressure) of systemic treatments is likely to more strongly reduce recidivism rates of serious (violent/versatile) crimes than individual treatment. In addition, systemic treatments seem to have a protective effect on criminal offending for adolescents at risk. Therefore, it is suggested to further implement systemic treatments in the forensic ambulatory/outpatient youth care and in the juvenile justice institutions. Implementing the systemic treatments as early as possible, for youth at high risk for delinquency, is crucial to counterattack their detrimental development. For youth with lower risks of developing delinquency, individual treatments like CBT are an interesting option. To address family problems and parental skills, both important risk factors for delinquency, it is advised for individual treatments to involve, parent(s), caregiver(s) as much as possible.

RESEARCH DIRECTIONS

For future research we strongly suggest other established treatments, like MST (called FAST ,Forensic Ambulatory Systemic Treatment, in the Netherlands), FFT (called RGT, Relational Family Treatment, in the Netherlands), BSFT, MTFC, and CBT, addressing substance abusing adolescents with comorbid behaviour problems to test the "*severity gradient*" for substance abuse, externalising disorders, delinquency and

possible other important variables, to be able to better match treatment with the characteristics of an adolescent.

Furthermore, for delinquency research, we suggest to investigate large groups of adolescents with persisting delinquent behaviour, looking at both self-report questionnaires and official crime records longitudinally, to gain a more comprehensive insight for this complex group of adolescents and to see which type of treatment works best for which type of adolescent. Although some insight has been given in this dissertation, we suggest further disentanglement of the underlying processes leading to criminal behaviour. For example, different risk profiles (compare adolescents with one or combinations of multiple risk factors) could give more direction for future research and make it possible to further explore the possible differences of effectiveness of evidence based treatments targeting delinquency (Mulder, Brand, Bullens, & Van Marle, 2011; Mulder et al., 2012).

Moreover, in this dissertation both individual CBT and the systemic treatment MDFT were found to be successful in decreasing problem behaviours of the adolescent. The two compared treatments are fundamentally different in their approach. Thus, are there different pathways leading to the same results or do they address the same mechanisms of change. This topic remains interesting for the research field to explore.

Finally, for creating a useful benchmark of treatment elements of evidence-based systemic treatments, more studies identifying common treatment elements (mechanisms of change, treatment techniques) should be conducted. With this extra knowledge more effective treatment components for systemic treatments or other evidence based treatments could be identified (Bell, Marcus, & Goodlad, 2013; Leijten et al., 2015). This benchmark could be used for future research and can facilitate the development of highly individualised approaches and/or innovative universal prevention programmes, trainings, and treatments, which could serve adolescents with problem behaviours and lessen the burden on society.

POLICY IMPLICATIONS

From a policy perspective, we would recommend that in ambulatory forensic youth care and in juvenile justice institution treatment, programmes are to be implemented that do not focus on just one behavioural problem (e.g. substance abuse protocols), but on the multiplicity of behavioural problems. Systemic treatments should play an important role in this process. As a prerequisite all adolescents with problem behaviours should be screened diagnostically to be able to match the most suitable treatment with each level of impairment and with the need and responsivity of the adolescent (Grisso, Vincent, & Seagrave, 2005). It must be stressed that more applicable treatments must be implemented and (further) developed for this difficult to engage group of adolescents. Furthermore, the implementation of the available evidence-based treatments, training programmes, and prevention programmes should, for the high-risk groups of youth, be given at the earliest age possible to prevent criminal behaviour and lower the risk of recidivism (Farrington, Coid, & Blumstein, 2003).

For delinquent adolescents with comorbid behaviour problems a new era is dawning in the Netherlands. Ambulatory treatments are implemented as an alternative for residential care. Conversely, in the residential care (mainly CBT-based) evidence-based treatments are increasingly being implemented. Smaller, more permeable juvenile justice institutions with an improved treatment climate have been created and are being researched for easier access of care and more possibilities for the adolescent to have contact with his/her parent(s), caregiver(s), family. Still, the awareness of the healing power of positive parenting, must be amplified and the further implementation of systemic (based) programmes and treatments in ambulatory and residential care, seems to be the next logical step. Furthermore, recently an innovative idea of creating so called trans forensic treatment teams (TFTT's) was developed. These TFTT's start treatment within the juvenile justice institutions and continue to deliver care when the adolescent has finished his/her sentence. It still means that adolescents are being punished for their crimes (they are deprived of their freedom), but instantaneously the psychiatric problems can be treated,

which could lead to even lower crime rates. Crime rates in the Netherlands and (in the most countries) worldwide are declining. Numerous juvenile justice institutions in the Netherlands are closing down. Therefore, in this moment of time, there is an opportunity for a more scientifically based and progressive approach towards delinquent adolescents. This means that what most guards, social workers, therapists, and researchers alike already understand, that new innovative solutions and more high quality (ambulatory) care for delinquent adolescents is the way to achieve a saver and healthier society.

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9

SAMENVATTING

Delinquente adolescenten met verslavingsproblematiek zijn kwetsbaar voor het ontwikkelen van psychiatrische stoornissen en vormen een gecompliceerde groep die moeilijk te behandelen is. Systemische behandelingen worden beschouwd als het type behandeling dat de meest veelbelovende resultaten oplevert bij de aanpak van probleemgedrag van deze adolescenten. Behandelaren die met deze groep adolescenten werken, hebben dagelijks te maken met ernstige problemen en moeten moeilijke beslissingen nemen, die gevolgen kunnen hebben voor de adolescent, zijn familie, zijn directe omgeving en de samenleving. Voor het forensisch onderzoeksveld is het begrijpen van de complexiteit van deze adolescenten van eminent belang, aangezien dit inzichten en praktische adviezen kan opleveren die kunnen leiden tot verbetering van de zorg en de vermindering van criminaliteit en andere gedragsproblemen. Dit proefschrift probeert de klinische praktijk en wetenschap te verbeteren door inzicht en kennis te verschaffen over: **1.** *de werkingsmechanismen, parameters en therapeutische technieken van systemische behandelingen*, **2.** *de effectiviteit van Multidimensional Family Therapy (MDFT)* en **3.** *de invloed van basiskenmerken van de adolescent op het behandelresultaat*. Dit om een beter inzicht te krijgen hoe systemische behandelingen werken en om deze beter te kunnen afstemmen met de psychosociale karakteristieken van de individuele adolescent met crimineel gedrag en verslavingsproblematiek. Hieronder worden de hoofdstukken van het proefschrift en de belangrijkste bevindingen samengevat.

In **hoofdstuk 2** werd, op basis van bestaande studies, de effectiviteit van Multidimensional Family Therapy (MDFT) onderzocht en een uitgebreide moderatoranalyse uitgevoerd. Een van de specifieke doelen van dit hoofdstuk was om na te gaan of adolescenten met ernstige problematiek meer profiteerden van MDFT dan adolescenten waarbij de problematiek minder ernstig was. Om de bovengenoemde doelen te bereiken, voerden we een meta-analyse uit, waarbij we 61 effectgrootten analyseerden, die uit 19 artikelen werden gehaald (N = 1.488 deelnemers). MDFT werd vergeleken met andere behandelingen: cognitieve gedragstherapie (CGT), groepstherapie (GT) en gecombineerde behandelingen (CT). Het potentieel van MDFT om middelenmisbruik, criminaliteit, externaliserende psychopathologie, internaliserende psychopathologie, en familie

problematiek te verminderen werd onderzocht. Vergeleken met andere behandelingen was MDFT effectiever in de vermindering van alle uitkomstcategorieën. Een belangrijke bevinding in deze studie was het vaststellen van de "*severity gradient*"; adolescenten met zeer ernstig probleemgedrag profiteerden significant meer van MDFT dan van andere behandelingen. De "*severity gradient*" werd gevonden voor adolescenten met een zeer hoge mate van cannabisgebruik en voor adolescenten met een oppositionele opstandige gedragsstoornis (ODD) en/of een normoverschrijdende-gedragsstoornis (CD).

In **hoofdstuk 3** werden gemeenschappelijke elementen van evidence-based systemische behandelingen geïdentificeerd. Daarvoor werden handleidingen/protocollen van evidence-based, systemische behandelingen voor adolescenten met disruptieve gedragsproblemen; normoverschrijdende-gedragsstoornis (CD), oppositionele opstandige gedragsstoornis (ODD) en middelgerelateerde en verslavingsstoornissen (CUD/SUD) geanalyseeerd. De vijf onderzochte systemische behandelingen waren: Multi Systemic Therapy (MST, in Nederland nu FAST genoemd), Functional Family Therapy (FFT, in Nederland nu RGT genoemd), Multidimensional Treatment Foster Care (MTFC), Brief Strategic Family Therapy (BSFT) en MDFT. Tussen de vijf onderzochte behandelingen werden veel gemeenschappelijk elementen gevonden, wat duidt op een sterke gedeelde basis. Er werden zes behandelingsmechanismen geïdentificeerd, zoals bijvoorbeeld, *betrokkenheid tonen* en *alliantie*. Daarnaast werden vier behandelingsparameters geïdentificeerd: *caseload, duur van de behandeling, het opleidingsniveau van de therapeuten,* en *de sessie-frequentie van therapie*. Verder werden er 16 therapeutische technieken gevonden, waaronder: *conflictbeheersing, communicatieve vaardigheden* en *reinforcement*. Er kan uit dit onderzoek geconcludeerd worden dat de geïdentificeerde gemeenschappelijke behandelingsmechanismen en therapeutische technieken gebruikt kunnen worden om een universeel systemisch behandelingsprotocol te ontwikkelen. Aanvullend zou er een wat toegankelijker preventie-training ontwikkeld kunnen worden, waardoor een brede doelgroep van adolescenten met probleemgedrag (delinquentie, verslavingsproblematiek, gezinsproblemen en psychiatrische psychopathologie) kan worden bediend.

Hoofdstuk 4 vergelijkt MDFT met Individuele Psychotherapie (IP). In dit hoofdstuk werd de zelf gerapporteerde criminaliteit bij jongeren in Nederland en Zwitserland als uitkomst gekozen. Het doel van dit hoofdstuk was het onderzoeken van de effectiviteit van MDFT op crimineel gedrag. De resultaten toonden aan dat beide behandelingen de criminaliteit aanzienlijk verminderen onder de onderzochte adolescenten. Bovendien, in vergelijking met mensen in de IP-behandelgroep, melden meer adolescenten die MDFT kregen (die in de 90 dagen voor het begin van de behandeling geen criminele voorgeschiedenis hadden gemeld), dat zij geen criminele activiteiten ontplooiden. Wanneer er een onderscheid wordt gemaakt tussen gewelds- en vermogensdelicten, zagen we dat MDFT beter in staat was de recidieven van geweldsdelicten terug te dringen dan IP, dit verschil werd niet gevonden voor vermogensdelicten.

Het eerste doel van **hoofdstuk 5** was het vergelijken van het effect van MDFT en CGT op het terugdringen van criminaliteit bij Nederlandse jongeren met verslavingsproblematiek op de lange termijn. Het tweede doel was om te onderzoeken of individuele eigenschappen van de adolescent een verschil in behandeleffect, gedefinieerd als vermindering van arrestaties, konden voorspellen bij MDFT en CGT. We veronderstelden dat bij beide behandelingen de geregistreerde criminaliteit zou verminderen, terwijl subgroepen met een hoge prevalentie van CD/ODD, of met ernstige verslavingsproblematiek, meer baat zouden hebben bij MDFT dan bij CBT. Terwijl de arrestatiecijfers (verkregen van de politie) in de drie jaar vóór behandeling sterk toenamen, daalden zij aanzienlijk na de aanvang van beide behandelingen. Er werden geen verschillen gevonden tussen CGT en MDFT met betrekking tot de vermindering van het aantal arrestaties. Verder werden er voor beide behandelcondities geen verschillen in vermindering gevonden voor gewelds-, vermogensdelicten en de mate van ernst van de delicten. Een mogelijk behandelingseffect (trend) ten gunste van MDFT werd gevonden voor vermogensdelicten, in de subgroep van adolescenten met zeer ernstig cannabisgebruik. Voor andere karakteristieken van de adolescent die van invloed zouden kunnen zijn op het behandeleffect zoals leeftijd, disruptieve gedragsstoornissen (DBD), voorgeschiedenis van crimineel gedrag, en problemen binnen de familie, werden geen verschillen gevonden.

In **hoofdstuk 6** hebben we het verloop op de langere termijn van crimineel gedrag (geregistreerde arrestaties) van de onderzochte jongeren/ jongvolwassenen, die MDFT en CBT kregen, onderzocht. De onderzochte periode werd verlengd tot tien jaar, van drie jaar voor aanvang van de behandeling tot zeven jaar na de start van de behandeling (follow-up). Dit werd gedaan om het effect van de overgang van adolescentie naar volwassenheid goed te kunnen bestuderen. Het doel was om beide behandelingen te vergelijken en te analyseren of de eerder gevonden reductie in criminaliteit zou beklijven. Het aantal arrestaties door de politie was in de zeven jaren na het starten van behandelingen, in zowel de MDFT- als in de CBT-groep, tot bijna nul gereduceerd. Beide behandelingen konden de lage niveaus van criminaliteit, die aan het einde van behandeling waren bereikt, gedurende de gehele follow up behouden. Met andere woorden: CGT als MDFT waren even effectief in het terugdringen van het totale aantal delicten, zowel voor het aantal gewelds- als vermogensdelicten. Uitgebreide moderatoranalyses toonde aan dat geen van de moderatoren van invloed was op recidivevermindering.

Er worden 6 belangrijke bevindingen gerapporteerd in dit proefschrift. *Ten eerste,* werd een aanzienlijke overlap van gemeenschappelijke behandelingselementen; behandelingsmechanismen, behandelingsparameters en behandelingstechnieken tussen evidence-based systemische behandelingen gevonden, wat wijst op een sterke gemeenschappelijke basis (hoofdstuk 3).

Ten tweede, konden verschillende evidence-based behandelingen, zoals CGT, MDFT, GT en CT, crimineel gedrag aanzienlijk terugdringen (hoofdstuk 2, 4, 5 en 6) en konden in ieder geval, CGT en MDFT het bereikte lage niveau van crimineel gedrag over een lange follow-up periode (7 jaar) behouden (hoofdstuk 6).

Ten derde, met betrekking tot de effectiviteit van systemische behandelingen, stelden we vast dat MDFT op de korte termijn iets betere resultaten opleverde dan GT, CGT, en CT, om delinquentie, middelenmisbruik, gezinsproblemen en psychiatrische psychopathologie

terug te dringen (Hoofdstuk 2).
Ten vierde, lijkt MDFT op de kortere termijn het meest geschikt voor de adolescenten met ernstige problematiek: middelenmisbruik (CUD/SUD) en CD en/of ODD. We noemden deze bevinding de “severity gradient” (hoofdstuk 2, 4).

Ten vijfde, lijkt MDFT betere resultaten dan IP te behalen bij het terugdringen van recidive onder gewelddadige daders (hoofdstuk 4).

Ten zesde, lijkt MDFT, vergeleken met GT, CT en CGT, beter risicojongeren te beschermen tegen het plegen van delicten (hoofdstuk 2, 4).

Concluderend kan gesteld worden dat evidence-based behandelingen (zowel systemische als individuele), gericht op criminele, verslaafde jongeren, succesvol zijn in het terugdringen van probleemgedrag (crimineel gedrag, middelenmisbruik, externaliserende psychopathologie, internaliserende psychopathologie en gezinsproblematiek). Verder is het belangrijk om de aard en ernst van de problematiek van de adolescenten goed te matchen met de juiste behandeling (“*the severity gradient*”). Tot slot wordt geadviseerd om evidence-based behandelingen voor deze complexe groep adolescenten verder te implementeren en te innoveren, in het ambulante werkveld, de klinieken en in de justitiële jeugdinrichtingen, waarbij meer dan nu gebeurd de kracht van het gezin centraal zal moeten komen te staan.

10

DANKWOORD

CURRICULUM VITAE

PUBLICATIONS

DANKWOORD

De nieuwsgierigheid om te weten te komen of de behandelingen die we inzetten bij jongeren die vastlopen in hun leven ook daadwerkelijk werken hebben geleid tot dit proefschrift.

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CURRICULUM VITAE

Thimo van der Pol was born on the 21th of October 1975 in the beautiful city of Gent, Belgium. In 1994 he started studying Clinical Psychology and Sinology at Leiden University. During his studies he worked with professor Graham Martin in Australia, who introduced him to scientific research. After obtaining his Clinical Psychology degree in 2000 he worked for two years as a Psychologist in Vienna, Austria. After his return to the Netherlands he started working at the Dutch Institute of Forensic Psychiatry and Psychology (NIFP), and at the Palmhuis (de Jutters) in The Hague. There he commenced his Psychotherapy training (RINO Utrecht), which he finished in 2010. In 2012 he started working at Arkin at the Forensic Psychiatric Department (Inforsa) in Amsterdam as a Forensic Psychotherapist and a Researcher, where he is currently working at the Forensic Youth Department (FJT). In 2010 he started his PhD project (Leiden University, VU University Amsterdam) under supervision of professor Robert Vermeiren.

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