



Full length article

## Cost-effectiveness of multidimensional family therapy compared to cognitive behavioral therapy for adolescents with a cannabis use disorder: Data from a randomized controlled trial

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## ABSTRACT

**Objective:** To evaluate the cost-effectiveness of Multidimensional Family Therapy (MDFT) for adolescents with a cannabis use disorder, compared to Cognitive Behavioural Therapy (CBT).

**Methods:** A parallel-group randomized controlled trial was performed. 109 adolescents with a DSM-IV cannabis use disorder (CBT n = 54; MDFT n = 55) were included. Assessments were conducted at baseline, and 3, 6, 9 and 12 months post-baseline, and included measures on cannabis and other substance use, delinquency, health care utilization, and general health related quality of life.

**Results:** Excluding those with missing cost-data, 96 participants (MDFT n = 49; CBT n = 47) were included. From a health care perspective, the average annual direct medical costs in the CBT group were €2015 (95% C.I. 1397–2714), compared to €5446 (95% C.I. 4159–7092) in the MDFT group. The average quality-adjusted life years (QALY's) gained were 0.06 QALY higher for the MDFT group, which led to an incremental cost-effectiveness ratio (ICER) of 54,308 Euro/QALY or €43,405 per recovered patient. Taking the costs of delinquency into account, the costs increased to €21,330 (95% C.I. 12,389–32,894) for the CBT group and to €21,915 (95% C.I. 16,273–28,181) for the MDFT group, which lead to an ICER of 9266 Euro/QALY or a cost per recovered patient of €7491.

**Conclusions:** This is the first comprehensive CEA of MDFT compared to CBT and it demonstrated that when costs of delinquency were included, the ICERS were modest. The results underline the importance of adopting a broader perspective regarding cost effectiveness analyses in mental health care.

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## 1. Introduction

In the Netherlands, individual Cognitive Behavioral Therapy (CBT) is the first choice psychosocial treatment for substance abusing adolescents. However, environmental factors, like substance abusing peers and parent-child relationship, also influence substance abusing adolescents (Broman et al., 2006; Choquet et al., 2008; Kristjansson et al., 2013) and need to be addressed in therapy. Multidimensional Family Therapy (MDFT) is a promising treatment, as it not only targets the individual but also the systems surrounding the individual.

In a meta-analysis that evaluated the effectiveness of outpatient substance abuse treatments for adolescents, family therapy was the

most convincing and consistent effective treatment for substance abuse, and although CBT was more effective than any other non-family treatment, family therapy was superior (Tanner-Smith et al., 2013). Based on these findings, family therapy is the treatment with the strongest evidence of comparative effectiveness, although most types of treatment appear to be beneficial in helping adolescents reduce their substance use.

A randomized controlled study in the Netherlands showed that MDFT and CBT were equally effective in reducing cannabis use and delinquent behavior in adolescents with a cannabis use disorder (Hendriks et al., 2011). Regarding cost-effectiveness, only a limited number of studies assessed family interventions in adolescents. To date, there is one randomized trial that showed that MDFT was more costly and was equal in clinical effectiveness compared to CBT (Dennis et al., 2004). This study was limited to the monetary benefits compared on two clinical outcomes: days of abstinence after 12 months and 'being in recovery' at the end of the study

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(defined by the authors as being abstinent and living in the community). In addition, as the study was conducted in the United States, the study findings cannot be generalized to the Dutch healthcare system without any consideration. Although studies evaluating the cost-effectiveness for MDFT are limited, the interest in cost-effectiveness analyses for relative expensive but commonly applied family treatments is strongly increasing as they compete with other (medical) treatments for health care budgets.

Next to difference in health care costs, cost savings may result from a decrease of adolescent criminal behavior. Cannabis and other substance use disorders in adolescents often coincide with delinquent behavior (Copeland and Swift, 2009). This relationship may reflect a common predisposition to addiction and delinquency, related to certain personality characteristics (e.g., impulsivity) and associated genetic factors (Sharma et al., 2014), decreased inhibitory control as a result of the acute effects of psychoactive substances or of chronic substance use (Volkow et al., 2003), an increased probability to commit crimes, to obtain money for buying drugs (Goldstein, 1985), as well as the influence of deviant peer affiliations on crime and substance use in adolescents (Fergusson et al., 2002). In any case, costs related to criminal involvement are important to include in a cost-effectiveness study of substance abuse treatment in adolescents.

The aim of the present study was to evaluate the cost-effectiveness of MDFT versus CBT in adolescents with a cannabis use disorder from a health care perspective. Additionally, the cost-effectiveness was assessed by including the costs of delinquency. We performed a cost-utility analysis, which has the advantage over a more general cost-effectiveness study in that the intervention is also comparable to interventions outside the mental health care system by using a generic outcome measure (quality of life). In addition, when treatments are equal in clinical effectiveness a cost utility study may add extra information on decisions for policy makers. Additionally we performed a cost-effectiveness analysis using a clinical outcome measure.

## 2. Material and methods

### 2.1. General study design

The cost-effectiveness analysis was conducted on data pertaining to the parallel-group randomized controlled study of Hendriks et al. (2011). This study was approved by the medical-ethical committee for research in mental health care settings of The Netherlands (METiGG; registration nr. 5238). This study was performed from March 2006 until October 2010 and evaluated the effectiveness of MDFT versus CBT. Eligible patients were randomly allocated (ratio 1:1) by the research group by using a computer-generated randomization list. Sample size calculation was based on Monte Carlo simulation techniques and resulted in a minimum of 100 and a maximum of 120 participants. Randomization was concealed and was conducted separately for the two study sites, and prestratified for age (13–14 vs. 15–18 years old), gender, ethnicity (Dutch/western vs. other) and frequency of cannabis use (< 75 days vs. ≥ 75 days in the previous 90 days), using blocks of two patients.

### 2.2. Participants

Adolescents (13–18 years old) with a cannabis use disorder who applied for treatment at two treatment sites in The Hague were screened. The following inclusion criteria were used: using cannabis for at least 26 days in the 90 days before baseline, meeting the DSM-IV diagnostic criteria for past year cannabis abuse or dependence, and written informed consent. In this trial, 109 participants were included (CBT n = 54; MDFT n = 55). The detailed study

protocol and results of this trial have been described elsewhere (Hendriks et al., 2011, 2012).

### 2.3. Treatments

**2.3.1. MDFT.** The intervention involved individual outpatient therapy and sessions with the parents and/or family, twice a week, 1 h each, for 5–6 months. MDFT is not only aimed at the individual but also at the relationship with parents, family members or other extra-familial relevant contacts so extra-familial sessions involving school, work, drug using peers, the court and the juvenile justice system were arranged if necessary. Therapists were trained by the developers of MDFT in the United States and the original manual of MDFT was used during therapy (Liddle, 2002). In addition, trainers were contacted monthly, to receive feedback and consultation.

**2.3.2. CBT (care as usual).** CBT consisted of individual outpatient sessions, once a week, 1 h each, for 5–6 months. A non-system-oriented session to provide parents with information and support was held once a month. The first four sessions focussed on enhancing treatment motivation, building rapport, determining treatment goals and conducting an initial functional analysis. Until the 12th session, the main goal of treatment was to develop skills and achieve and maintain abstinence from cannabis. After this, treatment focussed on topics indirectly related to maintaining abstinence. The duration of treatment was also 5–6 months, to synchronize with MDFT. Therapists were trained and used a manual based on the Cannabis Youth Treatment (CYT) study (Webb et al. 2016; Sampl and Kadden, 2001; Dennis et al., 2004).

### 2.4. Outcome measure and assessments

The total duration of the study was 1 year (5–6 months treatment and 6–7 months of follow up). Data were collected by independent research assistants. Cost-effectiveness was determined by evaluating the quality of life and whether a person was in 'recovery', and by calculating the direct medical costs and costs related to delinquency. Data on quality of life was collected at baseline, 6, 9 and 12 months, data on the health care costs at 6 and 12 months and costs related to delinquency were collected at baseline, 3, 6, 9 and 12 months. The primary outcome measure was costs per quality-adjusted life year (QALY). Recovery was a secondary outcome measure and was based on the definition as used in the original trial of Hendriks et al. (2011).

**2.4.1. Quality of life and recovery.** Quality of life was assessed with the Euroqol 5 Dimensions (EQ-5D; Cheung et al., 2009). The EQ-5D is a standardized, validated instrument and encompasses five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is rated by the patient on three levels (no problems, some problems, and extreme problems). Thus, 243 distinct health states are defined, each with a unique utility score, ranging from 1 (perfect health) to 0 ('death'). Adolescents were considered to be 'in recovery' if they lived in the community and were abstinent from cannabis, heavy alcohol use (≥ 5 glasses a day) and any other substance use in the 30 days preceding the month 12 assessment.

**2.4.2. Direct medical costs.** Direct medical costs were measured with the Treatment Inventory of Costs in Psychiatric Patients (TiC-P), a validated instrument (Bouwman et al., 2013) that records self-reported number of contacts with health care providers during the previous three months. Unit costs were valued according to prices reported in the Dutch manual for cost research (Hakkaart-van Roijen et al., 2010), so the costs can be obtained by multiplying the unit prices with the volume. The costs of the MDFT and CBT

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