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Matching adolescents with a cannabis use disorder to multidimensional family therapy or cognitive behavioral therapy: Treatment effect moderators in a randomized controlled trial

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ABSTRACT

Background: In a recent randomized controlled trial (Hendriks et al., 2011), multidimensional family therapy (MDFT) and cognitive behavioral therapy (CBT) were equally effective in reducing cannabis use in adolescents (13–18 years old) with a cannabis use disorder ($n = 109$). In a secondary analysis of the trial data, we investigated which pretreatment patient characteristics differentially predicted treatment effect in MDFT and CBT, in order to generate hypotheses for future patient-treatment matching.
Methods: The predictive value of twenty patient characteristics, in the area of demographic background, substance use, substance-related problems, delinquency, treatment history, psychopathology, family functioning and school or work related problems, was investigated in bivariate and subsequent multivariate linear regression analyses, with baseline to month 12 reductions in cannabis use days and smoked joints as dependent variables.
Results: Older adolescents (17–18 years old) benefited considerably more from CBT, and younger adolescents considerably more from MDFT ($p < 0.01$). Similarly, adolescents with a past year conduct or oppositional defiant disorder, and those with internalizing problems achieved considerably better results in MDFT, while those without these coexisting psychiatric problems benefited much more from CBT ($p < 0.01$, and $p = 0.02$, respectively).
Conclusions: The current study strongly suggests that age, disruptive behavior disorders and internalizing problems are important treatment effect moderators of MDFT and CBT in adolescents with a cannabis use disorder. If replicated, this finding suggests directions for future patient-treatment matching in adolescent substance abuse treatment.

1. Introduction

Although the field of adolescent substance abuse treatment research is still relatively young, the number of well-designed, controlled studies in this area is rapidly growing. Overall, these studies have provided consistent empirical support for the efficacy of both family-based approaches and cognitive behavioral therapy, when compared to a minimal treatment control condition, but no clear evidence for the superiority of one of these treatment models over the other (Dennis et al., 2004; Liddle, 2001; Liddle et al., 2004, 2008; Kaminer et al., 2002; Thush et al., 2007; Waldron et al., 2001, 2005; Waldron and Turner, 2008). Recently, Stanger et al. (2009) investigated the efficacy of contingency management (CM) as an add-on to motivational enhancement and cognitive behavioral therapy (MET/CBT), compared to MET/CBT without CM in adolescents with problematic marijuana use, and found superior outcomes associated with CM during treatment, but not during the post-treatment follow-up period.

In a recent randomized controlled study, we compared the effectiveness of outpatient multidimensional family therapy (MDFT) and individual cognitive behavioral therapy (CBT) in adolescents with a cannabis use disorder and found, in line with the conclusions above, significant pre- to post-treatment reductions in cannabis use and self-reported delinquency associated with both treatments but no differential treatment effect (Hendriks et al., 2011). Notably, in terms of 'treatment dose' (hours spent in therapy), adolescents and/or their system members in the MDFT-condition of this study had received three to four times as much therapy as those in the CBT-condition. Hence, we compared two treatments that differed considerably both in underlying treatment model and in intensity and duration, and nevertheless found no difference in results.

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This overall finding of lack of differential effect in randomized comparisons of active, well-established adolescent substance abuse treatments, often based on strongly diverging underlying models, points to an important, and increasingly acknowledged limitation of randomized controlled trials: they are, in a sense, based on a one-size-fits-all approach (Waldron and Turner, 2008). Within treatment groups, there is generally much heterogeneity in adolescent characteristics (e.g., age, ethnicity, substance use pattern, delinquency, psychiatric comorbidity) and adolescent subgroups in terms of these characteristics within each treatment condition may differ considerably in treatment outcome (Chan et al., 2008; Daudin et al., 2010).

Given this patient heterogeneity and the wide range of available treatment options, considerable efforts have been made in the adult addictions field to investigate "which treatment works best for whom." The largest study ever conducted in this area, Project MATCH, tested 10 a priori primary patient-treatment matching hypotheses, but failed to find any interaction effects that impacted drinking outcome (Project MATCH Research Group, 1998; 1999). Likewise, several other large-scale, well-designed studies provided little evidence that psychosocial substance abuse treatment effectiveness could be enhanced by matching patients to different types of treatments (Crits-Christoph et al., 1999; Ouimette et al., 1999; UKATT Research Team, 2008). In addition, although matching effects have been found in some studies (Rychtarik et al., 2000), replication of findings is lacking. Hence, despite considerable efforts, adult substance abuse studies to date have failed to find robust matching effects that could be used in allocation guidelines in clinical practice.

In contrast with the adult addictions literature, adolescent substance abuse treatment evaluations to date have paid little attention to the role of potential moderators of differential treatment effect. The few studies that did, found inconsistent results. In a randomized study in dually diagnosed adolescent substance abusers, Kaminer et al. (1998) hypothesized that patients with externalizing disorders would have better substance use outcomes in group CBT, whereas those with internalizing disorders without co-occurring externalizing disorders would benefit more from interactional group treatment. Contrary to their hypothesis, no significant matching effects were identified. In another randomized study in adolescents, Kaminer et al. (2002) compared outpatient group CBT with group psychoeducational treatment (PET), and found CBT to be superior to PET in terms of substance use outcomes, but only for male and older (16 years and older) adolescents, and only at short-term follow-up. No significant treatment group differences in substance use outcomes were found on any of the investigated psychopathology predictor variables (e.g. externalizing disorders, conduct disorder, internalizing disorders). In the context of a randomized controlled comparison of the effectiveness of MDFT and CBT in adolescent drug abusers, Rowe et al. (2004) differentiated between adolescents with, at baseline, only a substance use diagnosis, adolescents with a comorbid internalizing disorder, adolescents with a comorbid externalizing disorder, and those with both a comorbid internalizing and externalizing disorder. Although the shape of the substance use change trajectories from baseline to month 12 follow-up differed substantially between the comorbidity subgroups, these effects were not moderated by treatment condition, nor by age or gender. Recently, Henderson et al. (2010) re-analyzed data from a randomized trial comparing MDFT and CBT (Liddle et al., 2008), and found MDFT to be more effective than CBT in decreasing psychological involvement with substances ("substance use problem severity") in adolescent subgroups with high baseline psychological involvement and psychiatric comorbidity, but not in those with lower levels of involvement and comorbidity. In this study, however, no distinction was made between specific psychiatric diagnoses, and when actual frequency of substance use was used as outcome parameter, no significant differences in treatment effect of MDFT and CBT were found for either predictor variable (Henderson et al., 2010). Overall, the studies described vary considerably in types of interventions investigated, outcome measures used, and analytical approach, which may account for the inconsistencies found.

To summarize, although there is much agreement in the literature that psychiatric comorbidity is associated with poorer treatment outcomes in adolescent substance abusers (Grella et al., 2001; White et al., 2004), studies to date provide little evidence that certain types of treatment are more effective than others in adolescents with or without (different types of) comorbid psychiatric disorders. In addition, no robust predictors of differential treatment effect have been found in the area of demographic background or other domains of functioning (e.g., delinquency). Hence, further investigations are needed to identify which substance abusing adolescents benefit most from which type of treatment.

In the present study, we used the data of our randomized controlled trial comparing the effectiveness of MDFT and CBT in The Netherlands in adolescents with a cannabis use disorder (Hendriks et al., 2011) to investigate which baseline patient characteristics differentially predicted treatment effect – reduction of cannabis use from baseline to month 12 follow-up – in MDFT and CBT, in order to generate hypotheses for future patient-treatment matching.

2. Methods

2.1. Design

The randomized controlled trial (registration ISRCTN00179361) was both a 'stand alone' study in The Netherlands and part of a larger European project (Rigter et al., 2010). The trial was conducted from March 2006 to October 2010, and included 109 adolescents with a cannabis use disorder who applied for treatment at two treatment sites in The Hague. Following randomization, patients received a treatment offer of 5–6 months outpatient CBT (control group; $n = 54$) or MDFT (experimental group; $n = 55$), both followed by a naturalistic follow-up phase of 6–7 months. The primary time point at which treatment outcome was determined was 12 months after baseline. For an extensive description of the study procedures, the reader is referred to the original publication (Hendriks et al., 2011).

2.2. Participants

Included patients were 13–18 years old, met diagnostic criteria for past year cannabis abuse or dependence disorder (DSM-IV; American Psychiatric Association, 1994), had used cannabis on at least 26 days in the 90 days preceding baseline, were willing to participate in the study (written informed consent), and had at least one (step) parent or legal guardian who agreed to participate in the study.

2.3. Treatments

CBT consisted of weekly outpatient treatment sessions of 1 h with the individual adolescent during 5–6 months. In addition, a monthly, non-system-oriented session was scheduled for the parents, to provide information and support. Treatment was delivered by trained therapists who used a manual based on the MET/CBT12 curriculum used in the Cannabis Youth Treatment (CYT) study (Dennis et al., 2004; Sampl and Kadden, 2001; Webb et al., 2002). To harmonize the planned treatment duration with that of MDFT (5–6 months) in our study, the number of CBT-sessions was extended to 20, with a similar sequence of session-topics as in the CYT-manuals, and the manual was modified for individual therapy. The