



Do personality traits affect responsiveness of juvenile delinquents to treatment?



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ABSTRACT

Objective: The aim of the present study was to examine the moderating role of Big Five personality traits in short and long term effectiveness of MultiSystemic Therapy (MST) for serious and persistent juvenile delinquents.

Method: Data of a randomized controlled trial ($N = 256$) were used to examine the research question.

Results: Extraversion, Emotional Stability and Openness did not moderate short term effectiveness of MST, but Conscientiousness and Agreeableness did: MST was most effective for highly conscientious and highly agreeable juvenile delinquents. Personality did not moderate the effectiveness of MST on aggression or the long-term effectiveness of MST.

Conclusion: This study shows the importance of personality traits for short-term treatment outcomes, effectiveness of MST differs for high/low Agreeableness and Conscientiousness.

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1. Introduction

As juvenile delinquency is a costly problem for societies, it is crucial to identify effective treatments for delinquent youths. MultiSystemic Therapy (MST) is an intensive, ambulant, multimodal treatment for severe and persistent antisocial juvenile delinquents (Henggeler et al., 1986). MST is based on Bronfenbrenner's (1979) bio-ecological model and focuses both on the juvenile, and on the systems in which the juvenile functions, for example by supporting parents in improving their parenting skills (e.g., Clingempeel & Henggeler, 2002). Several studies have shown that MST is effective in reducing symptomatology (e.g., Henggeler, 2011). However, the effect size for reduction of delinquent behavior tends to be small (Van der Stouwe, Asscher, Stams, Deković, & Van der Laan, 2014). Although this may indicate that the effectiveness of MST is rather limited, Kraemer, Frank, and Kupfer (2006) pointed out that while treatment effectiveness for the total, often heterogeneous group of participants may be low, some homogeneous subgroups may be identified for whom

treatment is much more effective. The focus of studies then shifts from: "Does it work?" to "For whom does it work?" (Roth & Fonagy, 2006).

Many studies examining treatment for juvenile delinquents have included potential moderators of treatment effectiveness (e.g., Henggeler, Clingempeel, Brondino, & Pickrel, 2002). These research efforts have been mostly limited to ad hoc investigations of moderators that were simply available, such as demographic characteristics of the juvenile. However, as Kazdin (2007) emphasized, it is important that moderators are selected based on theoretical assumptions regarding their associations with the outcome under study, rather than simple availability. Choosing moderators based on theory increases insight into the applicability of treatments for specific groups, thereby improving effectiveness, and at the same time reduces the likelihood of 'chance' findings.

Personality, the core of individual differences in ways of behaving, thinking, and feeling, that is relatively stable across time and situations (Shiner & Caspi, 2003), has been relatively neglected in studies of treatment effectiveness. However, it is a central concept in several theoretical accounts of the etiology of behavior problems (Tackett, 2006), with the most influential model positing that personality as a stable, dispositional factor represents an individual vulnerability that makes some individuals more likely than others

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to develop behavior problems. In this study, we use the Big Five model to assess personality, describing personality along five dimensions or traits: Extraversion, Agreeableness, Conscientiousness, Emotional stability (vs Neuroticism), and Openness-to-experience. Agreeableness and Conscientiousness can be expected to be associated to behavioral problems such as Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD), as individuals who are low on Agreeableness are easily angered and lack empathy, and low Conscientiousness indicates low constraint and a tendency to act impulsively. A meta-analysis has shown that low Agreeableness and Conscientiousness are indeed most strongly linked with antisocial behavior and aggression in adults (Jones, Miller, & Lynam, 2011). Low Emotional stability was also associated with both antisocial behavior and aggression, whereas lower Extraversion and Openness were uniquely associated with aggression. In a study of children, De Haan, Prinzie, and Deković (2010) also reported associations between both rule-breaking and aggressive behavior and low Benevolence (the child trait most related to adult Agreeableness), and Conscientiousness. Low Emotional stability and high (rather than low) Extraversion were especially linked to aggression.

Although personality may be a vulnerability factor for problem behavior, theoretical accounts have also stressed the importance of the context in this association. Thomas and Chess (1977) posited that a goodness-of-fit between children's characteristics and the environment is important in determining whether problems will eventually develop. Children with certain temperament traits, which can be considered a precursor of later developing personality traits, may be especially likely to develop problems when they experience harsh and inconsistent parenting behavior for instance.

Although theoretically compelling, relatively few studies have provided evidence of these interactive effects between child personality and parenting. Child conscientiousness and benevolence (the child trait most related to agreeableness in adults) have been found to predict externalizing problems especially in the context of negative parenting (Van Leeuwen, Mervielde, Braet, & Bosmans, 2004). In another study, children who were low on Extraversion, Agreeableness, Conscientiousness, and Openness to experience were more likely to become aggressive when they experienced overreactive parenting (De Haan et al., 2010). Low Agreeableness has been linked with physical aggression in the context of negative parenting, whereas low Extraversion and Openness were related to relational aggression (Smack, Kushner, & Tackett, 2015). As some personality characteristics leave children especially vulnerable to negative environmental factors, these same personality characteristics may lead children to benefit especially from an intervention aimed at ameliorating this environment.

In addition to the importance of a person-environment fit, O'Connor and Dvorak (2001) have pointed attention to the fact that some personality characteristics may leave children unaffected by their environment. For these children there does not appear to be a (parenting-) environment that would fit their personality in such a way that they do not exhibit problem behavior. Although this type of interaction was very rare, when it did occur, it indicated that children (especially boys) low on Conscientiousness and Agreeableness displayed problems regardless of whether they experienced a positive or a negative parenting environment (O'Connor & Dvorak, 2001). This type of effect was more often found for rule-breaking than for aggression.

Although Big Five personality traits are rarely included as moderators of treatment effectiveness, a notable exception is the study of Stoltz et al. (2013), showing that less conscientious children indeed benefited less from an intervention targeted at reducing externalizing problems. However, they did not find an effect for Agreeableness. Rather, children who were high on Extraversion

also benefited less, indicating that high, rather than low Extraversion may indeed be linked to aggression in children.

Somewhat more studies have considered psychopathic traits as moderators of treatment effectiveness, which can be considered a combination of extremely low Agreeableness, Conscientiousness and Emotional stability, with additional associations to high Extraversion (Lynam et al., 2005). Several of these studies have found evidence for the notion of psychopathic traits leaving children unaffected by intervention efforts. For example, Hawes and Dadds (2005) found that boys who scored higher on callous-unemotionality were less responsive to disciplining within a parent-training intervention than boys who were lower on this trait. In terms of decreasing violent behavior however, Skeem, Monahan, and Mulvey (2002), concluded that patients with high scores on psychopathic traits were as likely to benefit from treatment as those with lower scores. In a previous investigation of MST, Asscher et al. (2013) found that MST was more effective than Treatment As Usual (TAU) in decreasing externalizing problems for juveniles scoring lower on callous-unemotional and narcissistic traits, but not for more callous-unemotional and narcissistic juveniles. In sum, competing predictions can be made regarding effectiveness of MST for youth with a vulnerable personality type; on the one hand, MST may be less effective for them as their problems are so strongly determined by their personality, that focusing on ameliorating negative contextual factors may not make much difference for them. On the other hand, their vulnerable personality type may also make them especially vulnerable to the negative effects of these contextual factors, and they may be especially likely to benefit from intervention efforts aimed at ameliorating these. The present study aims to examine empirically whether, and how juveniles' personality traits moderate the effectiveness of MST in reducing behavior problems. The findings of this study may help program providers to adjust intervention efforts to subgroups of juveniles with different personality characteristics.

In previous publications, we showed that MST was effective in changing self- and parent reported externalizing behavior problems (Asscher et al., 2013, see also Table 3). However, MST was not effective in reducing official delinquency data (Asscher et al., 2014), and the effect sizes for changes in externalizing behavior problems were only moderate (d s ranged from 0.06 to 0.36, depending of the type of externalizing problem behavior assessed and the source of information). The current study focuses on the moderating effects of personality traits on the short-term effectiveness of MST for serious and persistent juvenile delinquents in decreasing symptoms of behavior problems. We focus both on symptoms of Oppositional Defiant Disorder (ODD), Conduct Disorder (CD) representing the categorical classification of behavior problems of the Diagnostic and Statistical Manual, as well as on the conceptualization of behavior problems in terms of aggression and rule-breaking behavior, as differentiated in the dimensional approach posited by Achenbach (1991). These outcomes represent distinct subtypes of externalizing problems (Frick & Nigg, 2012), and each of these types of problems may show unique profiles of associations to personality traits (Jones et al., 2011). For example, given the associations of Agreeableness and Conscientiousness with antisocial behavior and aggression, one can expect differential effectiveness for juveniles low on Agreeableness and Conscientiousness in reducing symptoms of aggression, rule-breaking behavior, ODD and CD. For other personality traits the expectations were less clear. Emotional Stability may also be linked to ODD, CD, aggression or rule-breaking behavior, albeit less strongly. Extraversion and Openness to experience may be related to ODD and rule-breaking behavior only. Additionally, we investigate whether MST has long-term effects on official delinquency data for children with certain personality characteristics. Children

who are more agreeable and conscientious may also be more responsive to MST on the long term and less likely to reoffend.

2. Method

2.1. Recruitment and Randomization

Participants were adolescents who were referred to MST between 2006 and 2010 and who met the inclusion criteria for MST (MST Services, 2011). Immediately after referral, participants were randomized using a computerized randomization program. No significant differences were found on any of the demographic and dependent variables, suggesting that randomization was successful. For a more elaborate description of the trial's participants, see Asscher et al. (2013).

The design of the study was approved upon by the institutional review board and the medical ethic committee [Author Institution Name]. The trial was registered in the Dutch Trial register (number: 1390). The assessments took place at families' homes before the start of treatment and after termination of treatment, approximately six months later. Each family member received 10 euros for completing each assessment.

Fig. 1 charts the flow of participants from referral to data analyses. The recruitment rate was 81%, which is comparable to those in other MST trials (Henggeler, 2011). Despite extensive tracing efforts, 33 participants were lost to post-intervention assessment. Participants lost to post-intervention assessment did not differ significantly from those that were retained on any of the variables. Little's MCAR test indicated that data were missing completely at

random, $\chi^2(3097) = 3200.556, p = 0.095$. Thus, all participants were included in the analyses, and multiple imputation (Graham, 2009) was carried out using the expected maximization algorithm in LISREL 8.8 (Jöreskog & Sörbom, 2006).

2.2. Participants

A total of 256 adolescents and their families were randomized to MST ($N = 147$) or the control group ($N = 109$). The sample consisted of 188 boys and 68 girls. The mean age was 16 years ($SD = 1.31$). Fifty-five percent of the adolescents had a Dutch background. Half of the adolescents lived in a single-parent home. Fifty percent of the mothers and 36% of the fathers were currently unemployed. More than half of the families (56%) lived below minimum income standards and 45% of the families indicated that they experienced financial strains.

2.3. Conditions

2.3.1. MST

MST is based on social ecological and family systems theories, and on research on the causes and correlates of serious delinquency (Henggeler, 2011; Schaeffer et al., 2010). It addresses several key systems in which the adolescent is embedded: the family, the school, the peer group, and the neighborhood. MST services are often provided in homes at times that are convenient for the families, but meetings are also held in schools, neighborhood settings, or social service agencies. In consultation with family members, the therapist identifies a well-defined set of treatment goals,

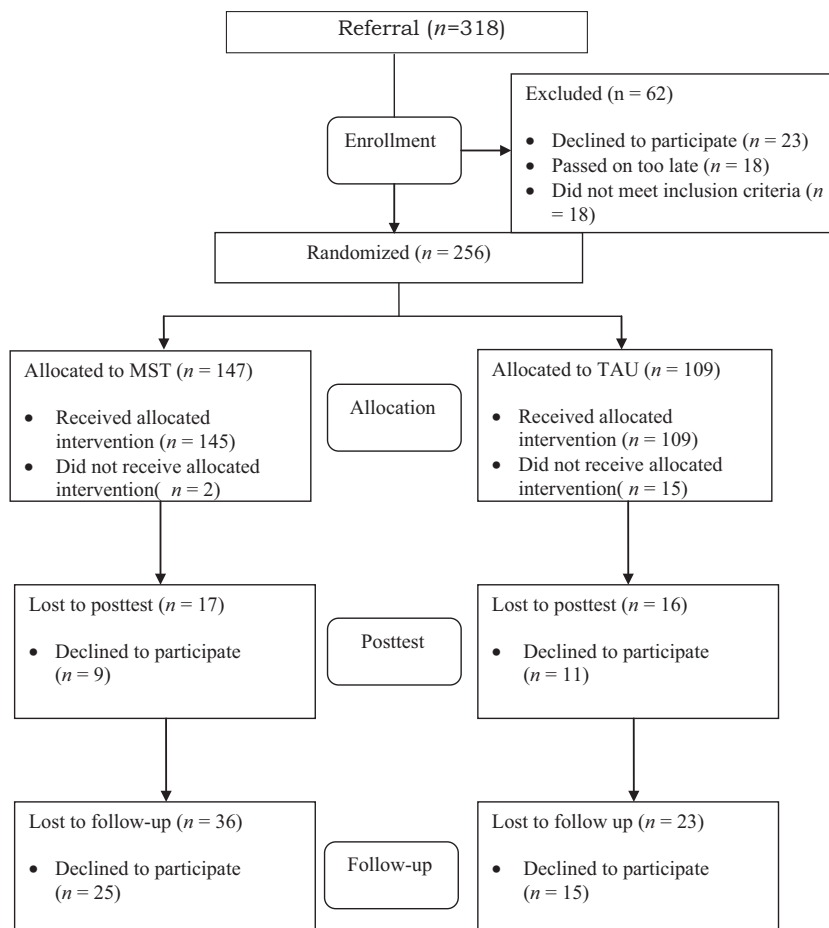


Fig. 1. Flowchart of participants.

assigns the tasks required to accomplish these goals, and monitors the progress in regular family sessions at least once a week. The MST therapist training protocol is quite comprehensive, yet the treatment itself is highly individualized to address specific needs of clients.

2.3.2. Treatment as usual (TAU)

Participants in the control condition received an alternative treatment that would have been offered had MST not been available. Mostly, these services included individual treatment (individual counseling or supervision by a probation officer or case manager, 21%), and family-based interventions (family therapy, parent counseling, parent groups, or home-based social services, 53%). Seven percent received a combination of care (e.g., individual treatment and family counseling), and 4% was placed in a juvenile detention facility. Fifteen percent eventually received no treatment due to various reasons such as moving or repeatedly not showing up at treatment sessions.

2.4. Measures

2.4.1. Primary outcome

2.4.1.1. ODD and CD. In order to determine short-term effects of MST, parents reported on their child's symptoms of ODD and CD by filling out the Disruptive Behavior Disorder rating scales (Oosterlaan, Scheres, Antrop, Roeyers, & Sergeant, 2000). Items of the *Oppositional Defiant Disorder* subscale (9 items; e.g., argues with adults, $\alpha = 0.92$ at T1 and T2) and the *Conduct Disorder* subscale (18 items; e.g., broke into and entered someone's home or car, $\alpha = 0.71$ at T1, and 0.83 at T2) were answered on a four-point scale, ranging from 1 (*not at all*) to 4 (*a lot*). The correlations between ODD and CD subscales was 0.64, $p < 0.01$.

2.4.1.2. Aggression and rule-breaking behavior. Parents were asked to report on aggression and rule-breaking behavior on the Child Behavior Checklist (Achenbach, 1991). The aggression subscale consisted of 19 items to be answered on a three-point Likert scale, ranging from 0 (*never*) to 2 (*often*). Cronbach's alpha's for aggression were α T1 = 0.91; α T2 = 0.91. The rule-breaking behavior subscale consisted of 13 items with α T1 = 0.82; α T2 = 0.83.

2.4.1.3. Official recidivism data. In order to determine long-term effects of MST, official recidivism data were collected from the official Judicial Registration System. The file dates of arrests and convictions was provided by the Dutch Ministry of Justice, based on the data files of the juveniles who were participating in the RCT. Total time to re-arrest was used as dependent variable.

2.4.2. Moderator

2.4.2.1. Personality. At pre-test, juveniles reported on their levels of Extraversion, Agreeableness, Conscientiousness, Emotional stability, and Openness to experience, by filling out the Dutch version of the 30 item Goldberg Big Five questionnaire (Goldberg, 1992). Juveniles were asked to report on a 7-point Likert scale if a certain description was *completely untrue* (1) or *completely true* (7) for them. An example of an item is "irritable". The questionnaire consisted of 5 subscales, each consisting of 6 items, with alphas ranging from 0.67 to 0.83.

2.4.3. Analytic strategy

ANCOVA's were performed, using general linear models, to test for intervention effects. Pre-test scores were entered as covariate and intervention status (MST or TAU) as fixed factor. standardized mean differences were calculated as effect sizes. Effect sizes of 0.20, 0.50 and 0.80 were considered as small, moderate, and large, respectively (Cohen, 1992). ANCOVA's were also performed

separately for each personality trait to test for moderator effects. Pre-test scores were entered as covariate, and intervention status and personality traits were entered as fixed factors. We employed the standard approach to investigating moderation based on recommendations of Baron and Kenny (1986) and Holmbeck (1997), which was also used by Stoltz et al. (2013), by analyzing personality traits based on categorical subgroups, being a low ($M - 1 SD$); moderate (ranging from $>M - 1 SD$ to $\leq M + 1 SD$) and a high group ($M + 1 SD$). Both extremely high and low variants of normal personality may be maladaptive (Van den Akker et al., 2013), and individuals scoring high on specific personality traits may be etiologically different from those who score low on those traits. Those juveniles may have different treatment needs accordingly. Descriptives of scores per subgroup per condition can be found in Table 1. Correlations between the dependent variables are presented in Table 2.

Analyses yielding a significant personality trait X intervention status on outcome effect, indicated that the personality trait was a moderator. When a significant moderator effect was established, post-hoc analyses were conducted for each group separately (low/moderate/high on a personality trait) in order to interpret the results. For each significant personality trait X intervention status interaction, again the ANCOVA's were carried out with outcome variable as dependent variable, pre-test score on the outcome as covariate, and condition as fixed factor. For the official delinquency data, Cox regression analyses were conducted, with time to arrest as dependent variable, time to follow-up centered around the mean, condition, personality trait and the interaction between condition and personality trait as predictors.

3. Results

3.1. Intervention effects

In two previous papers, the short- and long term effects of MST were published, indicating positive short and long term results for MST on self- and parent reported delinquency, ODD and CD, but no positive effects in terms of official delinquency data (Asscher et al., 2013, 2014). In Table 3, results of the previous effectiveness study that are of relevance for the present study are summarized. As can be seen in Table 3, MST is effective in changing ODD, CD and aggression (with effect sizes ranging from $d = 0.25$ to $d = 0.36$), but not in changing rule breaking behavior or official delinquency data (effect sizes were $d = 0.07$ and $d = 0.03$, respectively).

3.2. Moderating effects of personality

Results of the moderator analyses (Tables 4 and 6) showed that the interaction between Agreeableness and intervention status significantly predicted CD ($F(2, 249) = 3.944$, $p < 0.05$) and rule breaking behavior ($F(2, 249) = 3.210$, $p < 0.05$) at post-test. Additionally, the interaction between Conscientiousness and intervention status

Table 1
Descriptives of subgroups (low, moderate and high) per personality trait.

| Personality traits | Low | | Moderate | | High | |
|---------------------|-----|-------|----------|-------|------|-------|
| | N | M | N | M | N | M |
| Extraversion | 47 | 3.464 | 170 | 5.218 | 39 | 6.745 |
| Agreeableness | 37 | 3.190 | 180 | 5.183 | 39 | 6.692 |
| Conscientiousness | 42 | 2.389 | 171 | 4.200 | 43 | 5.853 |
| Emotional stability | 41 | 1.375 | 178 | 3.094 | 37 | 5.034 |
| Openness | 41 | 2.188 | 176 | 4.392 | 39 | 6.042 |

Note. Per personality trait categorical subgroups were made to distinguish juveniles scoring low ($M - 1 SD$); moderate (ranging from $>M - 1 SD$ to $\leq M + 1 SD$) and high ($M + 1 SD$) on a specific personality trait.

Table 2
Zero order correlations between ODD, CD, aggression, rule breaking behavior, official delinquency data and personality traits.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
|------------------------|--------|--------|--------|--------|-------|--------|--------|---------|--------|---|
| 1. ODD | 1 | | | | | | | | | |
| 2. CD | 0.55** | 1 | | | | | | | | |
| 3. Aggression | 0.67** | 0.41** | 1 | | | | | | | |
| 4. Rule-breaking | 0.58** | 0.48** | 0.72** | 1 | | | | | | |
| 5. Time to re-arrest | -0.07 | -0.05 | -0.05 | -0.06 | 1 | | | | | |
| 6. Extraversion | 0.05 | 0.03 | 0.05 | -0.03 | 0.02 | 1 | | | | |
| 7. Agreeableness | 0.00 | 0.05 | -0.06 | -0.12 | 0.06 | 0.14* | 1 | | | |
| 8. Conscientiousness | -0.15* | -0.07 | -0.14* | -0.16* | 0.08 | -0.07 | 0.40** | 1 | | |
| 9. Emotional stability | -0.09 | -0.06 | -0.13* | -0.15* | -0.06 | 0.37** | -0.04 | -0.23** | 1 | |
| 10. Openness | 0.06 | 0.06 | 0.00 | 0.06 | 0.19* | -0.13* | 0.26** | 0.34** | 0.32** | 1 |

Note. ODD = Oppositional Defiant Disorder; CD = Conduct Disorder.

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Table 3
Intervention effects at post-test (ODD and CD) and 2-year follow-up (arrests).

| | Pre-test | | Post-test | | F | d |
|------------------------------|-------------|-------------|-------------|-------------|----------|--------------------|
| | MST | TAU | MST | TAU | | |
| ODD | 2.03 (0.84) | 1.93 (0.75) | 1.76 (0.59) | 2.11 (0.64) | 27.77*** | 0.36 [0.11; 0.61] |
| CD | 1.36 (0.38) | 1.34 (0.29) | 1.24 (0.26) | 1.37 (0.27) | 15.76*** | 0.30 [0.05, 0.55] |
| Aggression | 0.78 (0.42) | 0.75 (0.45) | 0.58 (0.40) | 0.63 (0.37) | 4.21* | 0.25 [0.06, 0.50] |
| Rule-breaking | 0.65 (0.39) | 0.62 (0.37) | 0.51 (0.39) | 0.52 (0.32) | 0.32 | 0.07 [-0.18, 0.32] |
| Time to re-arrest (in years) | | | 1.02 | 0.99 | 0.04 | 0.03 [-0.29, 0.36] |

Note. Only for those juveniles for whom two year follow-up data were available (i.e., MST (Multisystemic Therapy) = 119, TAU (Treatment As Usual) = 73). Effect sizes (d) were recoded so that a positive effect size indicates change in the desired direction for MST.

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Table 4
Personality trait X intervention status interaction effects (F values).

| | ODD | CD | Aggression | Rule breaking |
|---------------------|--------|--------|------------|---------------|
| Extraversion | 2.167 | 0.603 | 0.961 | 2.23 |
| Agreeableness | 1.454 | 3.944* | 0.221 | 3.210* |
| Conscientiousness | 3.466* | 4.133* | 0.885 | 3.084* |
| Emotional stability | 0.079 | 0.292 | 0.049 | 1.101 |
| Openness | 1.777 | 0.943 | 0.201 | 0.124 |

ODD = Oppositional Defiant Disorder; CD = Conduct Disorder.
* $p < 0.05$.

Table 6
Hazard ratio and 95% CI of Cox regression analysis predicting reoffending by personality trait X condition interaction.

| Personality traits | Hazard ratio | 95% CI |
|---------------------|--------------|------------------|
| Extraversion | 1.392 | [0.485, 3.994] |
| Agreeableness | 1.168 | [0.684, 1.993] |
| Conscientiousness | 1.263 | [0.671, 2.397] |
| Emotional stability | 1.352 | [0.713, 2.564] |
| Openness | 1.073 | [0.606, 0.1.898] |

predicted ODD ($F(2,249) = 3.466, p < 0.05$), CD ($F(2,249) = 4.133, p < 0.05$) and rule-breaking behavior ($F(2,249) = 3.084, p < 0.05$) at post-test. No moderator effects of personality were found for aggression and the official delinquency data (see Table 6).

In order to facilitate interpretation of the interaction effect, we calculated Cohen's d per trait subgroup (low/moderate/high) (see

Table 5 and Fig. 2 for a comparison of effect sizes, in Cohen's d, for the subgroups). These posthoc analyses revealed that MST is most effective in decreasing CD for juveniles high on Agreeableness. For juveniles scoring low on Agreeableness, MST was less successful than TAU in decreasing rule-breaking behavior. For all three outcomes (ODD, CD and rule-breaking), the effectiveness of MST was highest for highly conscientious juveniles.

Table 5
Effect Sizes in d and 95% CIs for Significant Moderators Effects.

| | ODD | CD | Rule breaking |
|--------------------------|----------------------|----------------------|----------------------|
| <i>Agreeableness</i> | | | |
| Low | | -0.007 [-0.64, 0.65] | -0.642 [-1.30, 0.02] |
| Moderate | | 0.214 [0.08, 0.51] | 0.240 [-0.06, 0.54] |
| High | | 0.830 [0.17, 1.49] | 0.17 [-0.47, 0.81] |
| <i>Conscientiousness</i> | | | |
| Low | -0.331 [-0.94, 0.28] | -0.380 [-0.99, 0.23] | 0.274 [-0.33, 0.88] |
| Moderate | 0.417 [0.11, 0.72] | 0.348 [0.04, 0.65] | -0.116 [-0.42, 0.92] |
| High | 0.822 [0.19, 1.46] | 1.055 [0.40, 1.71] | 1.018 [0.37, 1.67] |

Note. Effect sizes were recoded so that a positive effect size indicates change in the desired direction for MST. ODD = Oppositional Defiant Disorder; CD = Conduct Disorder.

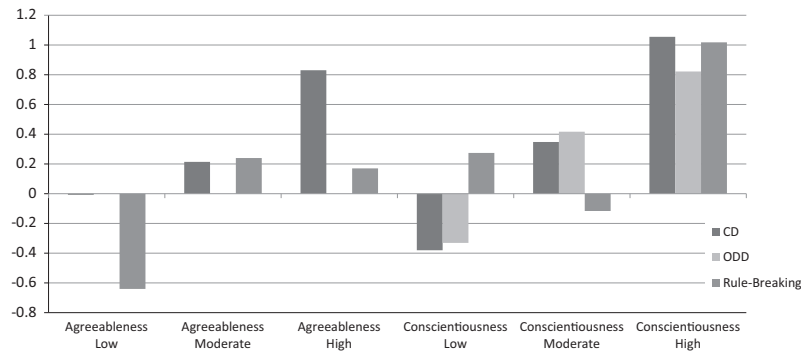


Fig. 2. Effect sizes (in *d*) for different levels of personality traits that significantly moderate the effectiveness of MST. Effect sizes were recoded so that a positive effect size indicates change in the desired direction for MST.

4. Discussion

The present study focused on the moderating role of child personality traits in the effectiveness of MST for severe and persistent juvenile delinquents. In line with our expectations, several personality traits moderated the effectiveness of MST at post-test, after 5 months of MST. Agreeableness moderated post-test CD scores indicating that MST was most effective for juvenile delinquents scoring moderate and high on Agreeableness at pre-test. For those scoring low on Agreeableness, MST was less successful than TAU in decreasing rule-breaking behavior. Additionally, MST was most effective for juveniles with high Conscientiousness scores: the largest decrease of CD, ODD and rule-breaking behavior was visible for highly conscientious MST participants, indicating that most beneficial effects of MST can be reached for juvenile delinquents scoring high on Conscientiousness. Personality traits did not moderate MST when aggression was the dependent variable, nor were long term moderator effects found for personality type.

The findings for Agreeableness and Conscientiousness are partially in line with Jones et al. (2011), who found like we did that these traits are the most important correlates of externalizing behavior. Given that MST is aimed at decreasing externalizing behavior, it could be expected that personality traits that are most important for externalizing behavior are also the most important moderators for the effectiveness of a program aiming to decrease those behaviors. Additionally, these results are in line with the findings of Stoltz et al. (2013), who found conscientiousness was important for the effectiveness of a school-based aggression reduction program. One explanation for our findings is that juveniles low on Conscientiousness have problems constraining impulses, and may be less punctual in their commitment to the program. Conscientious individuals on the other hand can be characterized as task and goal oriented, self-controlled, good in planning and rule-following (De Haan, 2011), and therefore less likely to fall back to delinquent behavior. In line with research on parenting x personality interactions (e.g., Becht, Prinzie, Deković, & Shiner, 2016), conscientious individuals may be more sensitive to positive changes in their environment, whereas juvenile delinquents who score low on Conscientiousness may be less affected by specific intervention techniques. This consistent with previous research suggesting that highly conscientious juveniles also show larger vulnerability to rearing practices (e.g., Belsky, 2005).

Extraversion, Emotional Stability and Openness did not moderate any of the post-treatment outcomes. These findings are in line with our expectations that especially Agreeableness and Conscientiousness would affect treatment outcomes (Jones et al., 2011). None of the personality traits moderated the effectiveness of MST on aggression on recidivism rates two years after treatment, indicating that the effects of personality diminish after treatment.

Apparently personality traits are more important during than after treatment.

The finding that no moderating effects occurred for aggression were more surprising. Given previous research that showed that conscientiousness moderated the effects of intervention on proactive aggression (Stoltz et al., 2013 found that intervention effects were largest for children with moderate conscientiousness scores), and previous studies suggesting that Conscientiousness and Agreeableness are especially important for aggressive behavior (Jones et al., 2011), we expected a moderating effect of these traits with aggression as dependent variable. One reason that no moderating effects for aggression were found in the present study, might be that we did not distinguish pro- and reactive aggression. It is possible that the problems of MST youth are more expressed as pro-active aggression rather than general aggression. Future research should further examine the relationship between personality traits and aggression in a sample of severely antisocial juveniles. More specifically, the difference between different types of aggression and rule-breaking behavior in relation to these traits should be studied in order to understand why personality traits do moderate rule-breaking behavior in this population, but do not moderate aggression.

The findings suggest that although MST is flexible in how it can be adjusted to the needs of clients, this flexibility does not seem sufficient to be more effective than TAU with juvenile delinquents low on Conscientiousness or Agreeableness. MST seems especially effective with highly Conscientious and Agreeable juveniles.

It should be noted that there are not many studies examining the moderating effect of personality. This is remarkable as personality is an important etiological factor explaining behavior (problems). Our findings are in line with the study by Stoltz et al. (2013) who did examine the moderating role of personality: despite differences in child age (elementary school age versus adolescence), problem severity (behavioral problems versus delinquent behavior), type of intervention (prevention program versus treatment) and mode of delivery (in the home/at school), we find partially the same interactions between personality traits and outcome measures. Personality traits may thus be more important in effectiveness studies than has been acknowledged to date.

There are some limitations worth mentioning. First, although the current sample is relatively large in comparison with other effectiveness studies (Farrington & Welsh, 2005) in the judicial context, the sub-samples used for the moderator analyses may in some cases have been too small to detect effects. A second limitation is that when interpreting the results of the present study, one should bear in mind that many analyses have been conducted (5 personality traits times five outcomes), and that significant effects have been found for only two (Agreeableness and Conscientiousness) out of the five personality traits on five outcome measures

(parent-reported ODD, CD, aggression, rule-breaking behavior and official delinquency data). The risk is present that the focus on those moderators that were significant, distracts from the total findings, including non-significant results (Feise, 2002). We therefore recommend replication of the current study with a larger sample, and/or by combining studies in a meta-analysis. It should also be noted that although the notion that personality represents a vulnerability for developing problem behavior has received most attention in the literature, other models of the association between personality and problem behavior are also worth considering. For instance, the spectrum model states that personality and problem behavior lie on a dimensional continuum. This model would predict that intervention aimed at reducing behavior problems may at the same time impact the underlying personality vulnerability (Tackett, 2006). More studies are needed to investigate this possibility.

Notwithstanding these limitations, the present study has several important implications for future research. The current study shows that personality, which can be theoretically expected to be associated to treatment effectiveness, affects the effectiveness of MST. This implies that MST therapists and other program providers offering treatment to juvenile delinquents should be aware of the potential null effects of their treatments for juvenile delinquents scoring low on Agreeableness or Conscientiousness. Once this finding has been replicated in other research, these professionals may want to adjust their treatments by adding specific components that may mediate the relationship between personality and externalizing behaviors. Future research could also examine if booster sessions may extend the beneficial effects of MST for specific personality types. Stoltz et al. (2013) pointed out that this way programs and interventions may be better adjusted to the specific needs of the child, which in turn may result in stronger intervention effects.

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