

Do Extremely Violent Juveniles Respond Differently to Treatment?

International Journal of
Offender Therapy and
Comparative Criminology
2018, Vol. 62(4) 958–977
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DOI: 10.1177/0306624X16670951
journals.sagepub.com/home/ijo



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Abstract

This study increases knowledge on effectiveness of treatment for extremely violent (EV) youth by investigating their response to multisystemic therapy (MST). Using data of a randomized controlled trial on effectiveness of MST, we investigated differences in treatment response between EV youth and not extremely violent (NEV) youth. Pre- to post-treatment comparison indicated MST was equally effective for EV and NEV youth, whereas treatment as usual was not effective for either group. Growth curves of within-treatment changes indicated EV youth responded differently to MST than NEV youth. The within-treatment change was for EV youth non-linear: Initially, they show a deterioration; however, after one month, EV juveniles respond positively to MST, indicating longer lasting, intensive programs may be effective in treating extreme violence.

Keywords

treatment response, multisystemic therapy (MST), extremely violent (EV) juvenile delinquents, externalizing behavior problems, parent–adolescent relationship quality

Delinquent acts, especially extreme violence, committed by juveniles attract much societal attention and often have an enormous impact. Extreme violence leads to large societal costs, directly associated with involvement of the judicial system (Azur,

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Garrazza & Goldweber, 2011). Victimization, in addition, leads to significant costs due to the involvement of mental health services (Delisi & Gatling, 2003; DeLisi et al., 2010; DeLisi & Piquero, 2011). Antisocial behaviors cost American society more than one trillion dollars each year (Anderson, 1999). Given the high economical and psychological costs, it is important to improve treatment and prevention efforts for extremely violent juveniles.

In the present study, we examined whether multisystemic therapy (MST) is an effective treatment for extremely violent youth. MST is a treatment program for persistent and serious juvenile delinquents (see for an overview, Henggeler, 2011). It is based on Bronfenbrenner's (1979) socio-ecological model, stating that the development of all behavior, and thus also the development of antisocial behavior, is the result of the interactions between individuals and the various systems in which they find themselves. In line with this model, MST focuses on risk factors of juveniles and their families within and between the different systems. This broad focus (on the various systems, the juvenile is embedded in, rather than on, the problem behavior specifically) is more likely to be effective with complex problems such as extreme violence than programs focusing on a single aspect of the problem, such as individual self-regulation (Farmer, Compton, Burns, & Robertson, 2002; Le'Roy, Vera, Simon, & Ikeda, 2000). Extreme violence is the most severe category of violent offenses, with a long sentence threat for offenders (i.e., those juveniles who have committed murder, or have used excessive violence in, for example, armed robberies; Farrington & Loeber, 2000). Although all the juveniles who receive MST show persistent and serious antisocial behavior, not all of them can be considered to be extremely violent (as those juveniles committed offenses such as robbery, theft from homes, possession of weapons, gang membership, drug possession, and trafficking). To our knowledge, none of the trials has identified whether MST is effective for the most severe category of violent offenders.

MST is likely to be effective for this specific group, as it is one of the few interventions that is well adjusted to the specific characteristics of the problem behavior intended to treat, as well as to the specific risk and protective factors for the onset and continuation of the problems of extremely violent juveniles (Farmer et al., 2002; Tzoumakis, Lussier, & Corrado, 2014). In addition, Azur and colleagues (2011) showed that although delinquency decreases over time, violence does not. Consequently, interventions are needed that reduce violence. Interventions aimed at reducing extreme violence should be based on empirically supported theories and on those (risk) factors that have been shown to be related to the onset and/or persistence of extreme violence. However, the literature regarding extreme violence is still limited, as much more research efforts have gone into identifying the factors that play a role in the onset and persistence of antisocial behavior in general, or in the predictors of persistent violence (e.g., Corrado, DeLisi, Hart, & McCuish, 2015), rather than extreme violence per se (Dishion, French, & Patterson, 1995; Dodge & Pettit, 2003).

MST may thus be suitable for extremely violent youth, given its theoretical basis focusing on risk factors that are linked with the development of antisocial behavior. In addition, because MST is intensive in nature and can be flexibly adjusted to specific

needs of clients, it may result in beneficial treatment results for extremely violent juveniles. However, although MST is a promising treatment for extreme violence, it was not developed for this group specifically, but for serious and persistent antisocial juveniles instead (Clingempeel & Henggeler, 2003). In MST terms, serious and persistent antisocial juveniles (the MST target group) are juveniles who show a chronic pattern of offending (i.e., in MST defined as two or more offenses) of who commit at least one serious crime. A crime is considered serious if it receives a score of eight or higher on a seriousness scale ranging from 1 to 10. Examples of crimes with this score include assaults/battery, grand larceny, and unarmed battery to murder (Borduin et al., 1995). The question remains whether MST is sufficiently adjusted to the group of extremely violent juveniles. In the present study, we identified the category of extremely violent offenders within a sample of serious persistent antisocial youth. Juveniles were considered extremely violent in the present study if they were reported to have used violence against a person, and were facing the highest possible sentence threat for that violent crime (in the Netherlands, this means 8 years imprisonment). Extremely violent juveniles are thus a subgroup within the target group of MST.

Farrington and Loeber (2000) concluded that, because most theories that focus on the development of antisocial/delinquent behavior do not specifically pay attention to violent behavior, little is known about risk factors for violence, let alone about extreme violence. Only a few studies have examined predictors of extreme violence, and studies examining extreme violence often suffer from methodological problems, such as small sample sizes and heterogeneity of the group of extremely violent juveniles (e.g., Farrington, 1985). Studies examining extreme violence (e.g., Vaughn, Salas-Wright, DeLisi, & Maynard, 2014) concluded that extremely violent youth are juveniles who showed lower academic performance, more internalizing behaviors, and less parental involvement. Farrington (1985) suggested that adult violent offenders more often had criminal parents and were more often exposed to harsh family discipline. In addition, violence, and especially extreme violence, has repeatedly been linked with the presence of psychopathic traits. Several researchers who examined the role of psychopathic traits in relation to offending trajectories (e.g., Corrado, McCuish, Hart, & DeLisi, 2015) showed psychopathic traits to be related to a persistent violent offending trajectory. McCuish, Corrado, Hart, and DeLisi (2015) showed that psychopathic personality disturbance predicted persistent violent offending. Moreover, serious, violent, and chronic offenders are more likely to have started committing crimes before the age of 12 (Baglivio, Jackowski, Greenwald, & Howell, 2014). Frick, Ray, Thornton, and Kahn (2014) stated that children and adolescents with severe conduct problems and callous-unemotional psychopathology traits may show different etiological factors underlying their behavior and consequently may need different intervention approaches. In line with this, Barry, Golmaryami, Rivera-Hudson, and Frick (2013) suggested a more comprehensive diagnostic approach to identify those juveniles early in the diagnostic and treatment process. Whatever may be the cause of the extreme violence shown by a subgroup of the MST participants, MST is, given its multimodal nature and its flexibility to adjust to the needs of the individual, a potentially effective treatment. Thus, although MST seems to be a promising treatment for extremely

violent youth as compared with treatment as usual (TAU), this group may still be less responsive than other antisocial juveniles (e.g., Lipsey, 2009), because MST may not sufficiently address the specific problems that characterize extremely violent youth. Extremely violent youth may need specific techniques that address their specific needs related to their delinquent behaviors, and that are responsive to their risk level (Andrews & Bonta, 2010).

A recent meta-analysis showed a small but significant positive effect of MST on delinquency (Van der Stouwe, Asscher, Stams, Deković, & van der Laan, 2014). The Dutch Effectiveness Study of MST showed positive results in terms of parent- and self-reported data for primary outcomes (Asscher, Deković, Manders, van der Laan, & Prins, 2013), whereas official delinquency data showed no differences in recidivism between MST and TAU (Asscher et al., 2014). Kraemer, Frank, and Kupfer (2006), however, criticized the over interpretation of “overall” treatment effects, which apply to the complete treatment population, rather than to individual clients. They recommend to always examine the effectiveness of treatment for subgroups within the total treatment population, that is, to use moderator analyses to examine for whom a specific treatment works.

To date, studies examining moderators of treatment effectiveness mainly examined demographic characteristics, such as age or gender (Kazdin, 2007). It may, however, be more useful to examine client characteristics that are related to the problems for which the client is treated. Manders, Deković, Asscher, van der Laan, and Prins (2013), for example, examined whether the effectiveness of MST was moderated by psychopathic traits and found that MST was more effective than TAU in decreasing externalizing problems only for a “lower callous/unemotional” and “lower narcissism” group. Surprisingly, knowledge on whether extremely violent juveniles respond differently to treatment is still lacking. As little is known about specific predictors for extreme violence, even less is known about effectiveness of treatment for this extreme group. The present study aims to increase knowledge on effectiveness of treatment for extremely violent youth by investigating whether they respond differently to MST than antisocial youth who are not extremely violent. This question is examined in two ways. First, we examined pre- to post-treatment change. Next, to determine *how* change occurs and when the most important changes happen over the course of treatment, we modeled the trajectories of change using monthly measures.

Method

Participants

The sample consisted of 256 juveniles who were assigned to MST ($n = 147$) and a TAU ($n = 109$) control group condition. Immediately after referral, participants were randomized with a computerized randomization program, separately for each site. The randomization ratio was adjusted in a 1:2 ratio in favor of MST for a 6-month period, due to a low number of referrals. Once an adolescent was randomized to TAU, the staff involved in the referral (from Bureau Youth Care or Child Protection Council), together

with the MST supervisor, referred the adolescent to an alternative treatment (for a more elaborate description of the randomization process, see Asscher, Dekovic, Van der Laan, & Prins, 2007).

Data were collected by research assistants before the start of the treatment, each month during treatment, and immediately after termination of the treatment ($M = 5.72$, $SD = 1.90$, months after pretest) in the homes of the participants. For the within-treatment assessments, a shortened version of the questionnaire was used, with two indicators per subscale. These questions were answered by telephone. Research assistants were blind to the study hypotheses. The complete research protocol can be obtained from the first author.

The design of the study was approved by the institutional review board and the medical ethic committee of Utrecht University. Thus, this study has been approved by the appropriate ethics committee and has therefore has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments; additionally, specific national laws have been observed. The trial was registered in the Dutch Trial register (number: 1390).

According to official judicial data, 71% of the participants had been arrested at least once before treatment. According to the self-reports, 64% of the adolescents had contact with the police at some point during the year before the baseline assessment. Despite extensive tracing efforts, 33 participants were lost to post-intervention assessment, and 59 participants were lost to follow-up. Participants lost to post-intervention assessment and follow-up did not differ significantly from those retained on any assessed variable. Thus, all 256 participants were included in the analyses (using intention to treat analysis), and using LISREL 8.8, multiple imputation was carried out using the expected maximization algorithm (Graham, 2009). Little's MCAR test indicated that data were missing completely at random, $\chi^2(3,097) = 3,200.556$, $p = .095$.

The sample consisted of $n = 188$ boys and $n = 68$ girls, with an age of $M = 16.02$, $SD = 1.31$. Fifty-five percent of the adolescents had a Dutch ethnicity. Of the adolescents belonging to ethnic minority groups, most had a Moroccan (34%) or a Surinamese (32%) background. Half of the adolescents came from a single-parent family. Fifty percent of the mothers and 36% of the fathers were unemployed. Forty-five percent of the families experienced financial strains and more than half of the families (56%) lived below minimum income levels. Independent-samples t tests for continuous variables and chi-square analyses for categorical variables were used to examine difference between treatment conditions at T_1 on demographic and the outcome variables. No significant differences were found on any of these variables, suggesting that randomization was successful.

Conditions

MST. MST is based on social ecological and family systems theories, and on research on the causes and correlates of serious antisocial behavior (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009; Schaeffer et al., 2010). It addresses several key systems in which the adolescent is embedded: family, school, peer group, and

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, 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.

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 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% were placed in a juvenile detention facility. Fourteen percent eventually received no treatment due to various reasons such as moving house or repeated no show at treatment sessions (a flowchart indicating the flow of participants is presented in Figure 1).

Extremely violent juvenile delinquents. Within the sample, we selected, based on official delinquency data, juveniles who were extremely violent. Extremely violent youth ($n = 71$) were those juveniles who, according to official data of the Dutch Ministry of Justice, were the most severe category of sentence threat (≥ 8 years of imprisonment) for a violent offense following the categorization of van der Laan and Blom (2006), consisting of juveniles who committed murder/manslaughter (10%), violent armed robbery (75%), or violent assaults (15%). There were no differences between the extremely violent and the not extremely violent group in demographic characteristics and division over conditions (Table 1). The two groups, however, differed significantly in the total number of police contacts, according to adolescents' self-report, the number of police contacts during the past year, according to official statistics, and in the severity of offenses indicating that the extremely violent juveniles, as expected, had more police contacts in total and during the past year and conducted more serious offenses.

Measures

Pre- and post-treatment assessment. The sole use of parent-reported data may inflate estimates of intervention effectiveness (Maughan, Christiansen, Jenson, Olympia, & Clark, 2005); consequently, composite scores, combining different measures and/or sources of information, are likely to provide a better measurement, and have a better predictive validity than a single measure or a source of information (van Dulmen & Egeland, 2011; Webster-Stratton, Reid, & Hammond, 2001). Therefore, in the present study, all other constructs were assessed using a multi-informant, multi-method approach, including parent reports, adolescent reports, and observational measures. To create a composite score for each construct, the following strategy was used

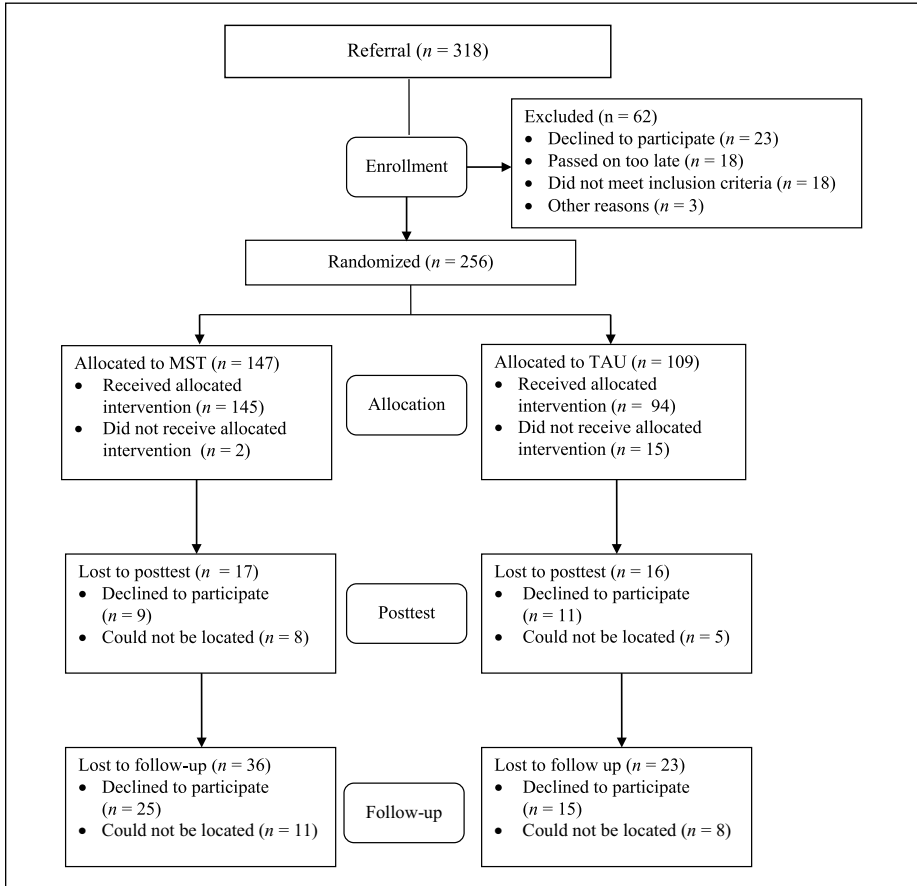


Figure 1. Flow diagram participants on pre-test, post-test, and follow-up.
 Note. MST = multisystemic therapy; TAU = treatment as usual.

(Patterson, DeGarmo, & Forgatch, 2004; Webster-Stratton et al., 2001): First, we selected the indicators (scales from established measures) for each construct. The alphas for all indicators were acceptable, ranging from .61 to .94, with a median of .83. Next, a single-factor model was tested using confirmatory factor analysis (CFA) in LISREL 8.80, based on the covariance matrix and maximum likelihood estimation. An adequate fit of a single-factor model, with significant factor loadings of indicators, was seen as support for the hypothesis that the indicators representing the construct addressed one underlying dimension and could thus be combined into a composite score. The composite was computed by averaging the scores of the indicators. All items were standardized before computing the composite. Standardization was performed across the full sample and across both time points, so that the relative differences in variability across time were preserved.

Table 1. Demographics and Treatment Condition of Extremely Violent and Not Extremely Violent Youth.

	Extremely violent (n = 71)	Not extremely violent (n = 185)	t/ χ^2	p value/d
Condition (MST)	59%	57%	0.121	.728/.044
Gender (male)	76%	72%	0.345	.557/.074
Ethnicity Dutch	47%	58%	2.936	.087/.215
Single parenthood	54%	57%	0.218	.641/.058
Mother unemployed	42%	49%	0.843	.359/.115
Father unemployed	30%	30%	0.002	.964/.006
Financial strains	52%	40%	3.065	.080/.220
Net family income < €1.350	58%	54%	0.283	.595/.067
M age (SD)	15.902 (1.396)	16.070 (1.269)	-0.924	.356/-.129
Total number of police contacts (A)	2.972 (1.464)	2.403 (1.360)	-2.587*	.010/-.361
Total number of police contacts (OD)	2.859 (1.447)	2.573 (1.509)	-1.373	.171/.192
Past year's police contacts	1.676 (0.841)	1.205 (0.822)	-4.076***	.000/-.569
Severity of offense			61.145***	.000/§
Violence	43%	36%		
Sex	3%	1%		
Armed robbery	37%	0%		
Non-violent property	16%	40%		
Vandalism	12%	3%		
Other ^a	10%	0%		

Note. MST = multisystemic therapy; A = adolescent report; OD = official data.

^aDrug-related offenses, traffic, other.

*p < .05. ***p < .001.

Externalizing problems. Both parent and adolescent reports were used. Parents filled out the 33 items of the *Externalizing Problems* scale from the Child Behavior Checklist (Achenbach, 1991). The adolescent version of this scale, the Youth Self Report, had 30 items, to be answered on a 3-point Likert-type scale ranging from 0 = *never* to 2 = *always*. In addition, adolescents reported on their involvement in delinquent behavior during the past 6 months using the Self-Report Delinquency (SRD) scale (Elliott, & Huizinga, 1983), by indicating whether they had been participating in specific crimes during the past 6 months (1 = *yes*; 0 = *no*). The SRD *Violent Offending* scale consists of five items (e.g., assault, sexual offense), and the *Property Crimes* scale consists of 10 items (e.g., theft, property damage). Finally, two scales, filled out by the parents, from the Disruptive Behavior Disorder Rating scales (Pelham et al., 1992) were used: the *Oppositional Defiant Disorder* scale (nine items) and the *Conduct Disorder* scale (18 items). A single-factor CFA on these six indicators yielded an adequate fit, $\chi^2(12) = 15.54$,

$p = .213$, root mean square error of approximation (RMSEA) = .034, comparative fit index (CFI) = .993. The composite alphas were .84 (T1) and .87 (T2).

Relationship quality. Four of the eight indicators were parent reports. The first indicator, *responsiveness*, was an eight-item subscale of the Nijmegen Parenting Questionnaire (Gerris et al., 1993), rated on a 6-point scale. The second indicator, *acceptance of the child*, was a 12-item scale from the Parenting Stress Index (Abidin, 1983), rated on a 6-point scale. Third, the degree of *conflict and antagonism* in the parent–adolescent relationship was assessed with six items from the Network of the Relationship Inventory (NRI; Furman & Buhrmester, 1985), rated on a 5-point scale. Fourth, the *problems in communication* were assessed with five items from the Parent–Adolescent Communication Scale (PACS; Barnes & Olson, 1985). Three indicators were adolescent reports. In addition to the adolescent version of the NRI and PACS, *attachment* of the adolescent to the parent was assessed with the Inventory of Parent and Peer Attachment (IPPA; Nada Raja, McGee, & Stanton, 1992), consisting of 12 items. Finally, observers' ratings of 20 items from the Coder Impressions Inventory (CII; Webster-Stratton et al., 2001) were used as an observed measure of *relationship quality*. The CII is based on the observer's overall impressions of the parent, adolescent, and their interactions during an unstructured home observation. Immediately after a home visit, the research staff rated 20 items tapping parental responsiveness/nurturance and child bonding with parent, on a 3-point scale (1 = *did not occur* to 3 = *four or more examples*). The coders had extensive training with videotapes before home visits and achieved agreement of >80% during training. The CFA on these eight indicators yielded an adequate fit, $\chi^2(23) = 35.63$, $p = .045$, RMSEA = .046, CFI = .982. The composite alphas were .77 (T1) and .81 (T2).

Within-treatment assessment. The same concepts were assessed monthly in a telephone interview with a shortened version of the above questionnaires. The items that most adequately tap each construct were selected, based on face validity and examination of items' factor loadings in the previous studies. Adolescents and parents were asked whether they or their child /parent showed behavior described in each item (1 = *true* or 2 = *false*) *during the last month*. Again, composite scores were created combining both parent and adolescent reports.

Externalizing problems included four items to be answered by the parent and five items to be answered by adolescents (e.g., “stole something”), with internal consistency ranging from .74 to .84.

Relationship quality was assessed by five items answered by the parent (e.g., “I was satisfied about the way I and my child talked to each other”) and five items answered by the adolescents (e.g., “I had a fight with my parent”), with alphas ranging from .68 to .84.

Analyses

First, to formally test moderation, that is, to find out whether extreme violence moderates pre- and post-test changes, ANCOVAs were conducted with the outcomes (externalizing behavior and relationship quality) at post-test as dependent variables, pre-test scores of

externalizing behavior problems and relationship quality, respectively, as covariate, and treatment condition and extreme violence (yes/no) as factors. Each general linear model examined the main effects of extreme violence and the interaction effects of Extreme violence \times Condition. Analyses yielding a significant Extreme violence \times Condition interaction indicated that extreme violence was a moderator. Cohen's d was computed as an index of effect sizes, based on adjusted means and standard errors.

Second, to describe patterns of change over time across the different groups to investigate differences, multigroup latent models were used. We investigated differences between extremely violent and not extremely violent juvenile offenders with regard to change in externalizing behavior and parent-adolescent relationship quality over the course of treatment. The four groups were extremely violent youth who received MST (MST-EV), not extremely violent youth who received MST (NST-NEV), extremely violent youth who received TAU (TAU-EV), and not extremely violent youth who received TAU (TAU-NEV). To allow for non-linearity of change, models included (in addition to the intercept factor) linear, quadratic, and cubic slope means. As differences between groups were of interest, within-group slope variances were constrained to zero to reduce the number of estimated parameters and allow for model estimation. Error variances between adjacent measurements were allowed to covary (with covariances constrained across groups, but freed if modification indices indicated significant differences across groups). We examined group differences as follows. As a multivariate test of significance, we compared a fully constrained (which assumes that both the initial levels and the change in response to treatment is the same across all four groups) with a fully freed model (which allows for differences across the groups), as a multivariate test of significance. If the fully constrained model provided a significantly worse fit than the free model, we examined which parameters were different. First, we examined whether the intercept variances differed between the groups. In a next step, intercept means were examined for differences between groups, as a randomization check. Finally, to examine whether there are differences in change during treatment, the slope means were examined for differences between groups. The linear, quadratic, and cubic slope means were freed simultaneously, as the different slopes are dependent on each other. Throughout the successive steps, parameters that did not result in a significant improvement in model fit when they were freed were left constrained across groups. Analyses were performed in Mplus 7.11 (Muthén & Muthén, 1998). Incremental fit of models was investigated using the chi-square difference test. We assessed model fit of the final models with the CFI, with CFI $>$.90 indicating a good fit, and the RMSEA, with RMSEA $<$.05 indicating a good fit, and RMSEA $<$.10 indicating an acceptable fit (for an overview of model fit statistics, see Hu, Bentler, & Hoyle, 1995).

Results

Pre- and Post-Treatment Change

Table 2 shows the mean externalizing and relationship quality scores separately for extremely violent and not extremely violent juveniles, for the MST and control conditions. The indicated d s show a decrease of externalizing problems and improvement of

Table 2. Means and Standard Deviations at Pre- and Post-Test for Extremely Violent and Not Extremely Violent Youth in MST and TAU Conditions.

	MST				TAU				<i>d</i> (for condition)
	T1		T2		T1		T2		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Externalizing behavior (EV)	.089	.690	-.209	.655	.220	.632	-.086	.487	-.14 [-.618; .329]
Externalizing behavior (NEV)	.179	.763	-.178	.655	.042	.697	-.030	.609	-.44 [-.731; -.1427]
Relationship quality (EV)	-.007	.754	.081	.529	-.094	.526	-.124	.457	.49 [.011; .971]
Relationship quality (NEV)	.003	.653	.057	.445	.059	.589	-.100	.481	.57 [.269; .862]

Note. MST = multisystemic therapy; TAU = treatment as usual; EV = extremely violent; NEV = not extremely violent.

relationship quality between pre- and post-test, for each group. To examine potential moderating effects of extreme violence, ANCOVAs were conducted. The moderator analysis examining externalizing behavior problems revealed no main effect for extreme violence, $F(1, 255) = 0.907, p = .342$, indicating that extreme violence does not independently predict post-test scores of externalizing behavior. Nor did being extremely violent moderate the effectiveness of MST for externalizing behavior problems, F extreme violence \times Condition interaction (1, 251) = 1.382, $p = .241$. For relationship quality, comparable results were found. Neither main effect for extreme violence, $F(1, 255) = 0.948, p = .331$, nor interaction was significant, F extreme violence \times condition interaction (4, 251) = 0.102, $p = .749$. These results suggest that MST effectiveness for the extremely violent and nonextremely violent groups was not statistically different.

Within-Treatment Change

To examine changes during treatment, multigroup growth models were fitted to investigate differences in changes in externalizing behavior and relationship quality between violent and not extremely violent juvenile offenders, who received MST versus those who received TAU. The final model for externalizing behavior provided an adequate fit to the data: $\chi^2(43) = 69.29, p = .007, CFI = .972, Tucker-Lewis (TLI) = .974, RMSEA = .10$. The final model for parent-adolescent relationship quality fit the data well: $\chi^2(43) = 43.88, p = .434, CFI = .998, TLI = .998, RMSEA = .02$ (for parameter estimates of the final model, see Table 3; for a graphical representation of the estimated change trajectories, see Figures 2 and 3).

Juveniles (both violent and not extremely violent) who received MST differed from those who received TAU with regard to their changes in externalizing behavior and

Table 3. Intercept and Slope Factor Means for the Final Growth Models.

	MST-EV	MST-NEV	TAU-EV	TAU-NEV
Externalizing behavior				
Intercept (SE)	1.86 (0.01)** _a	1.86 (0.01)** _a	1.86 (0.01)** _a	1.86 (0.01)** _a
Linear slope (SE)	0.38 (0.28) _a	-0.21 (0.24) _b	-0.22 (0.21) _c	-0.22 (0.21) _c
Quadratic slope (SE)	-4.15 (1.79)* _a	0.88 (1.44) _b	0.65 (1.36) _c	0.65 (1.36) _c
Cubic slope (SE)	6.50 (2.95)* _a	-1.95 (2.21) _b	-0.74 (2.25) _c	-0.74 (2.25) _c
Relationship quality				
Intercept (SE)	1.35 (0.02)** _a	1.35 (0.02)** _a	1.35 (0.02)** _a	1.35 (0.02)** _a
Linear slope (SE)	-1.82 (0.48)** _a	0.02 (0.42) _b	0.55 (0.43) _c	0.55 (0.43) _c
Quadratic Slope (SE)	11.15 (3.39)** _a	-0.93 (2.74) _b	-2.31 (2.80) _c	-2.31 (2.80) _c
Cubic Slope (SE)	-16.55 (6.25)** _a	2.52 (4.60) _b	1.05 (4.77) _c	1.05 (4.77) _c

Note. Different subscripts (_{a, b, or c}) indicate statistically significant differences between groups. MST-EV = multisystemic therapy—extremely violent; NEV = not extremely violent; TAU = treatment as usual. **p* < .05. ***p* < .01.

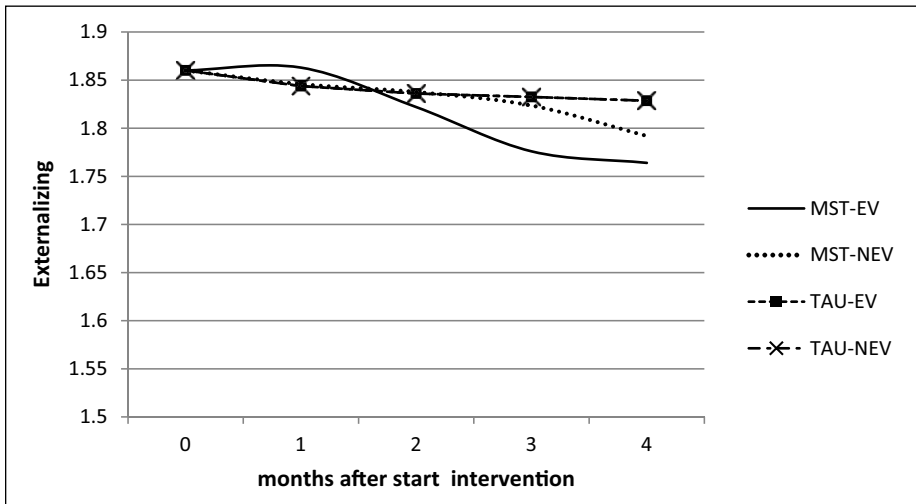


Figure 2. Estimated change trajectories of externalizing behavior across the intervention period for the four groups.

Note. The lines indicating TAU-EV and TAU-NEV are overlapping. MST-EV = multisystemic therapy—extremely violent; NEV = not extremely violent; TAU = treatment as usual.

parent–adolescent relationship quality during the 5-month treatment period. For youth who received TAU (both violent and not extremely violent), levels of externalizing behavior and parent–adolescent relationship quality did not change significantly. There was no difference between the extremely violent and the not extremely violent groups for TAU participants.

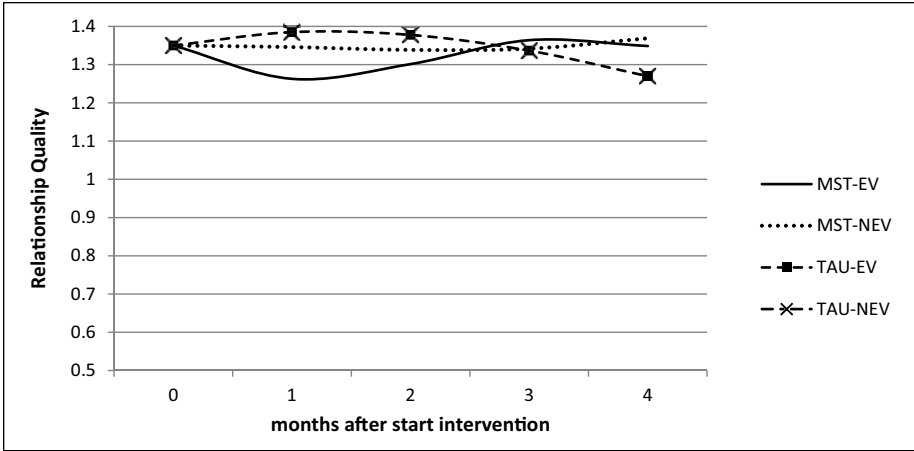


Figure 3. Estimated change trajectories of parent–adolescent relationship quality across the intervention period for the four groups.

Note. The lines indicating TAU-EV and TAU-NEV are overlapping. MST-EV = multisystemic therapy–extremely violent; NEV = not extremely violent; TAU = treatment as usual.

Within the group of juvenile offenders who received MST, extremely violent youth differed from the not extremely violent youth in the pattern of change. For the extremely violent youth who received MST, the within-treatment change was non-linear: Externalizing problems increased slightly during the first month of treatment, and then decreased to levels below the other groups. Similarly, relationship quality first worsened. Then, between 1 and 3 months, the quality of the parent–adolescent relationship improved, and then, after the third month, stabilized.

Discussion

The present study examined whether juveniles who show extremely violent behavior respond differently to MST than juveniles who do not exhibit extremely violent behavior. First, when examining pre- to post-treatment change, the present study revealed no moderator effects for extreme violence, suggesting no differences in overall treatment response between juveniles showing extreme violence and juveniles not showing extreme violence. In other words, MST was more effective than TAU for both groups, suggesting that MST also succeeds in reaching beneficial effects for generally hard to treat juveniles. MST has previously been shown to be an effective treatment for groups that can be considered “hard-to-treat” (see, for example, Henggeler, Cunningham, Pickrel, Schoenwald, & Brondino, 1996). However, analyses of within-treatment changes show that the extremely violent juveniles participating in MST do respond differently to treatment from both not extremely violent MST participants and TAU participants regarding both outcomes: externalizing behavior and relationship quality. Despite an initial increase in externalizing behavior problems during the first month of

treatment, the extremely violent juvenile offenders show a larger decrease in externalizing behavior problems toward the end of treatment. The same pattern is visible for parent–adolescent relationship quality: Despite an initial deterioration, eventually, the quality of relationship improved in the group of extremely violent juveniles.

The changes in externalizing behavior may explain similar developments in relationship quality. MST aims to teach parents a more active parenting style. Possibly, parents as well as adolescents need a period of adaptation to the changing interaction styles that may become reflected in an initial deterioration of the quality of their relationship. When adolescents' externalizing behavior improves, the relationship quality also improves. Stoolmiller, Duncan, Bank, and Patterson (1993) described a similar phenomenon as “resistance to change” in parent training therapy. They found a pattern of initial resistance to the use of new parenting techniques, which in the beginning of treatment leads to deterioration of the situation. After overcoming this resistance, improvement will eventually occur. This “struggle- and- working-through” (Stoolmiller et al., 1993, p. 927) is believed to be a crucial aspect for treatment success. In dynamic systems approaches, this initial resistance period has been referred to as destabilization, and is deemed critical to treatment success (Lichtwarck-Aschoff, Hasselman, Cox, Pepler, & Granic, 2012). It is possible that in the group of extremely violent juvenile offenders and their parents, a similar process takes place and is needed in order to change.

An important theoretical question unanswered by the present study is *why* some juvenile offenders show extreme violent behaviors. Corrado, DeLisi, et al., (2015) demonstrated that psychopathic traits are associated with trajectories of high and persistent levels of delinquency. However, the role psychopathy plays in extremely violent offending as compared with more general delinquency has yet to be examined.

The present study is, to our knowledge, one of the first to study monthly treatment response in a group of extremely violent juveniles. The finding that change in externalizing behavior problems for extremely violent juvenile offenders is non-linear is important, as it suggests that for extremely violent juveniles, behavior change follows a different pattern than in a not extremely violent group. Previous studies examining effectiveness of treatment for juvenile offenders show that several programs (such as counseling, restorative programs, or skill programs) offered to violent (but not extremely violent) juvenile offenders showed less effectiveness for violent juveniles than for not violent youth (Lipsey, 2009). The current study, in line with this, shows that MST can be effective with violent, and even extremely violent, youth: Despite an initial deterioration, eventually, MST seems equally effective for extremely violent juveniles than for the not extremely violent juveniles. These outcomes are likely to be the consequence of the flexibility of MST to adjust to the individual needs of various types of clients as well as its intensive character. Fagan and Catalano (2013) also concluded that largest effects on violence were to be obtained with longer lasting programs. Given the repeatedly reported importance of callous-unemotional traits and low self-control for violence (see, for example, Flexon & Meldrum, 2013), it may be important to further study these associations and incorporate these variables into treatment. MST therefore may be one of the few intensive interventions as described by Frick and colleagues (2014) that can be effective for the group of severe conduct disordered juveniles as it is adjusted to the

specific needs of this group, by adjusting to the cognitive and emotional needs of high Callous-Unemotional traits (CU) juveniles.

The difference in within-treatment change between the violent and not violent groups may indicate that a different order of changes may be necessary for different subgroups of individuals. For example, certain groups may need to reach some level of "problem awareness" during the first month(s) of treatment, which in that phase may even lead to an increase in (self-reported) problematic behavior. Although it may seem that problems worsen, problem awareness may be a necessary condition for positive changes to occur (Ward, Day, Howells, & Birgden, 2004). Future research may investigate whether problem awareness indeed increases for (families of) extremely violent youth in the first month of MST, as well as whether an increase in problem awareness is necessary for subsequent improvement. From a developmental and clinical perspective, the pattern among MST-EV youth can be explained by bearing in mind that the parents of the juveniles are attempting to control behavior of these extremely violent juveniles (perhaps for the first time), which will naturally increase their acting out behavior in an attempt to get parents to give up their efforts. However, those juveniles will eventually accept such controls when parents exhibit consistency. The phenomenon may better be viewed as an extinction burst rather than an adverse treatment effect. The MST model explicitly predicts an escalation in youth behavior at treatment outset (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009), as do most parent management approaches with younger oppositional youth (Webster-Stratton & Taylor, 2001). Having shown such a pattern, it is important that MST therapists prepare parents for what might come and to provide them with tools to be able to persist in exerting control.

The present study sheds light on processes that remain invisible when pre- and post-test design would have been used, while especially the change over time *during* treatment is relevant to clinicians. For clinical practice, apart from change over a longer period of time, especially the shape of individual trajectories of change is relevant (Stoolmiller et al., 1993). It is important to be aware of periods of increase of problems during treatment that can be seen as "normal" response for specific subgroups. Moreover, as said, it is important that clinicians prepare parents for the increase of problems in the beginning of treatment and that clinicians are available when crises occur. Especially, this kind of information helps the clinician to shape his treatment, to know what to expect, and to adjust the intervention to specific needs.

There are several limitations worth mentioning. A first limitation concerns the sample size: Although we selected the most extremely violent group from a group of violent juvenile offenders, a group of $n = 71$ is still relatively small. This also is the case for pre-test post-test moderation tests. For the subgroups, the power is quite low, and therefore, we cannot rule out that no moderating effects have been found as a consequence of a power problem. To allow for estimable models, within-group differences in change over time were not modeled. Although investigation of within-group differences is not necessary when investigating differences between groups over time, including larger groups would have allowed us to understand potential differences within groups. However, previous researchers already suggested that the group of extremely violent

offenders is just a small percentage of the delinquent population (Vaughn et al., 2014). From that point of view, our sample size is quite acceptable. A second limitation is that we do not know sufficiently about what happened in the control condition in terms of duration and intensity of treatment. We do know that 14% of the control group did not receive any treatment (for comparison, 2% of those assigned to MST did not receive treatment). Therefore, we cannot rule out that intensity and duration affect the outcomes, rather than what is done during treatment. In future trials, aiming to examine effectiveness of treatment for extremely violent juveniles, intensity and duration of TAU should be monitored carefully. A third limitation of the present study concerns the selection of extremely violent juveniles. As there is no official definition of extreme violence, we operationalized extreme violence as the combination of use of violence and high sentence threat, as sentence threat is a better proxy for the severity of the crime committed (index offense) than, for instance, actual sentence, which may be lower due to reasons not related to the crime itself. It is therefore possible that the not extremely violent juveniles have just not yet developed into extremely violent juveniles. It should be noted that other operationalizations are also possible, for instance, differentiating the continued use of violence when the victim is not (or no longer) a possible obstruction to the offender's goal. However, for the present study, this kind of information was not available. In addition, it is important to acknowledge that causes/drivers of behaviors such as callous unemotionality are not considered in this study. That is, the presence of such a trait did not inform treatment decisions or classification as extremely violent. Instead, the presence of documented aggressive acts was a starting point. Future research could focus on the association between extreme violence and the presence of CU traits aiming to unravel processes leading to this behavior.

The present study is, to our knowledge, one of the first to examine differential treatment response of juvenile delinquents using multiple assessment points, allowing us to examine within-treatment change. The present study showed that MST is effective for extremely violent youth, but this group shows different pattern of change during the treatment than juvenile offenders who do not show extreme violence. In addition, future research should carefully examine whether extremely violent juveniles also show CU traits. Future research on characteristics of extremely violent juvenile delinquents may explain why the extremely violent group shows a different pattern of change. For example, patterns of desistance seem to differ between juveniles showing callous-unemotional traits and being violent and those who do not show these traits (Kahn, Byrd, & Pardini, 2013), indicating that juveniles higher on CU traits tend to reoffend more often. This may be valuable information for both clinical practice (professionals should not get discouraged if in the beginning of treatment, certain groups seemingly deteriorate), as well as for researchers in the field of the development of delinquent behavior. Patterns of desistance, which were to date defined for total populations, may differ between groups.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was funded by Grants 473-04-408 and 8250.0002 from The Netherlands Organisation for Scientific Research and The Netherlands Organisation for Health Research and Development.

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