Youth Level of Service/Case Management Inventory Assessments as Predictors of Behavioral Change in Multisystemic Therapy and Functional Family Therapy in Norway

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Abstract
Background: Multisystemic Therapy (MST) and Functional Family Therapy (FFT) are evidence-based Blueprint programs shown to be effective towards youth problem behaviors. Purpose: The present study aimed to investigate treatment outcomes following MST and FFT among Norwegian youths with serious behavior problems. Research design: Routine Outcome Monitoring (ROM) data of the Youth Level of Service/Case Management Inventory at intake and post-test was used along with measures of five national treatment goals. Study sample: The study is based on two samples of youths assigned to MST (n = 2018) and FFT (n = 453). Analysis: Data were analyzed separately for MST and FFT, to explore changes during treatment and accomplishment of the treatment goals. Results: At intake youths in MST showed a significant higher level of risk factors compared to those referred to FFT. Significant reductions in risk factors and behavioral problems were evident for both interventions. Follow-up results demonstrated sustained reductions of problem behaviors. Conclusion: Both treatments decrease risk factors and increase the completion of outcome goals. Implications of the results are discussed.

Keywords
youth problem behaviors, Multisystemic Therapy, Functional Family Therapy, intervention, risk factors

Young people with severe conduct problems are characterized by, for example, violent or aggressive behaviors, crimes, school problems, alcohol or drug abuse, and they often have friends who influence them negatively (Dishion & Patterson, 2006). Some of these youths end up in prison, or they become incarcerated in group homes (Hart & Hare, 1997; Moffitt, 2018). Research has supported the use of home- and community-based treatments for adolescent behavior problems in order to prevent placement out of home and reoffending (McCart & Sheidow, 2016). In the present study, we aimed to examine changes in risk factors and problem behaviors among youths receiving Multisystemic Therapy (MST; Henggeler et al., 1998) or Functional Family Therapy (FFT; Alexander & Parsons, 1973), using the Youth Level of Service/Case Management Inventory - Part I (YLS/CMI; Hoge & Andrews, 2011). Further, we investigate how these changes relate to risks of future norm- and rule-breaking behavior as measured by a set of overarching behavioral treatment goals. Both MST and FFT are well-established US-developed Blueprint programs (Mihalic et al., 2004) that have been implemented and tested in Norway during the last decades.

Multisystemic Therapy was the first program to be introduced to Norway. In 1999, a nation-wide implementation of the program was initiated with an aim to make the service available to youths with serious behavior problems in all 19 Norwegian counties. However, whereas US-based MST teams typically are found in the juvenile justice system, MST teams in Norway were established in the child welfare system, since most youths in Norway with serious behavior problems under the age of 18 are transferred to child welfare. Only those who commit extremely serious criminal offenses (e.g., murder) are relayed to the justice system (Grøning & Sætre, 2019). Other than this accommodation to systems, translation, and cultural adaptation of materials, the MST program was implemented in Norway as prescribed by the US-developer organization.

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Multisystemic Therapy and Functional Family Therapy

Multisystemic Therapy is a family- and community-based treatment aimed toward adolescents aged 12–17 years with serious conduct problems. The youth lives at home during the course of treatment, and the intervention is mainly directed toward the family and social systems, in which the young person is embedded (e.g., school and peer relations). The MST model is a licensed program that is disseminated by MST Services. MST treatment is guided by nine principles that are applied in an analytic process focusing on creating engagement with the family, clarifying treatment goals, assessing multisystemic drivers to undesired behaviors, targeting prioritized drivers with research-supported interventions, continuously monitoring treatment progress, and adjusting treatment interventions based on weekly feedback (Henggeler et al., 1998). Adherence to the MST model is assessed by monthly phone interviews to family members, where they respond to the 28-item Therapist Adherence Measure - Revised (TAM-R; Henggeler et al., 2006). While some TAM-R questions relate to what the therapist did in the session (i.e., therapist adherence), others relate to how the family members experience working with the therapist (Lange et al., 2020). An MST team consists of a supervisor and 3–4 therapists who are available for the families 24/7. Each therapist has a caseload of 3–4 families, and they meet with each family several times a week, and often their social network. The course of treatment typically lasts 3–5 months.

Several studies have shown that MST is effective in reducing adolescent criminal activity ($N = 176$ youths; Schaeffer & Borduin, 2005) and substance use ($k = 22$ studies; $N = 4066$ youth; van der Stouwe et al., 2014). However, a superior effect of MST is not always observed, and a recent meta-analysis argues that the variability in the effectiveness of MST may be affected by implementation issues, concurrently available services, and the chosen measure of outcome (Litell et al., 2021). The impact of MST should therefore be continuously researched in each specific context where it is implemented. Currently, 21 MST teams are established across Norway, and these had served more than 11,000 youths from 1999 through 2021. Positive youth outcomes among Norwegian youths were demonstrated in a randomized controlled trial (RCT) from 2004 ($N = 100$ youth; Ogden & Halliday-Boykins, 2004) and a follow-up study in 2006 ($N = 75$ youth; Ogden & Hagen, 2006). The current study will assess change in youth receiving MST in Norway using a larger and more recent sample.

Functional Family Therapy targets youths aged 11–18 years, with moderate to serious conduct problems. The treatment is a licensed program that is disseminated by FFT LLC. FFT integrates system, behavioral, communication, and cognitive theory (Alexander et al., 2013). The model is made up of five distinct treatment phases with specific treatment goals and interventions: (1) engagement to ensure participation in session from both youth and parents, (2) motivation to change negative views and blame towards hope and a relational focus, (3) assessment of risks, relational dynamics and skill needs, (4) behavior change through building new skills in the family with in-session practice, and (5) generalizing changes by relapse prevention and community support. The intervention usually lasts 10–30 sessions and is carried out in an outpatient setting, where both the youth and their family meet with their therapist on a weekly basis (or more if needed). FFT sessions can occur in a clinic office, in the family’s home, or another setting by choice of the family and therapist. An FFT team comprises of a team supervisor and 2–5 therapists. The treatment is research-based and focuses on relational processes in the family (Sexton & Alexander, 2005). Several studies, most of them from the United States, have shown that FFT has a positive effect on adolescents’ conduct problems and reduces relapse into serious crime ($N = 917$ families, $N = 118$ families, and $N = 14$ studies, respectively; Graham, et al., 2013; Hartnett et al., 2017; Sexton & Turner, 2010). As for MST, there are some studies that find no difference between the FFT group and the control condition ($N = 75$ youth; Humayun et al., 2017), and there are review articles that point to these inconsistent results across studies (Weisman & Montgomery, 2019). Again, this variability can have many potential causes, and calls for asserting the impact of the FFT program in each specific context. In Norway, the first FFT teams were established in 2007, and currently, five teams are in operation. Through 2021, these teams have provided FFT to more than 1700 youths and their families. There is no previously published research on FFT in a Norwegian context.

One of the main differences between MST and FFT is that the latter requires the youth to be present and participate, whereas MST often start out with only the parents, since the adolescent initially may refuse to attend. Second, the MST therapists make frequent (sometimes daily) home visits in the family, while FFT typically has frequent meetings only in the beginning and is then implemented through weekly meetings,
for example, in the therapist’s office. Consequently, MST usually comprises a higher treatment dose, more sessions, and a higher intensity compared to FFT. In addition, it is expected that the load of problem behaviors is higher in MST than in FFT at intake, given that the FFT has broader inclusion criteria. This assumption was confirmed in a comparison study of FFT and MST from the Netherlands that found a larger proportion of males and risk indicators among MST youth (Eeren et al., 2018). Interestingly, they found self-reported, but not parent-reported, internalizing, and externalizing problems to be significantly higher among the youths receiving FFT. Another study, comparing MST and FFT treatment in Florida, showed the opposite pattern, that is, youths referred to FFT had a more serious criminal offense history compared to those referred to MST (Baglivio et al., 2014). The fact that the FFT referrals were older could however explain why this group showed a more severe profile of behavior problems.

Measurements of Change and Outcome Goals

Most clinical outcome trials of MST and FFT have used well-established outcome measures like the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) or the Strength and Difficulties Questionnaire (SDQ; Goodman, 1997). A limitation associated with these assessments is that they do not take into consideration the interactive nature of serious conduct problems, and they assess little contextual information. The focus is on externalizing and internalizing problem behaviors, which to a lesser extent predict the risk of antisocial behaviors in the future. In this study, risk factors were assessed using the Youth Level of Service/Case Management Inventory - Part I (YLS/CMI; Hoge & Andrews, 2011), which provides a generic assessment of risks including criminal history and seven malleable or dynamic risk factors (Andrews & Bonta, 2010). Altogether, the eight subscales are: 1) prior/current offenses/dispositions, 2) family circumstances/parenting, 3) education/employment, 4) peer relations, 5) substance abuse, 6) leisure/recreation, 7) personality/behavior, and 8) attitudes/orientation/beliefs. The domains are used to produce an assessment of the risk of reoffending, and identify of the individualized factors amenable to change. In addition, five overarching behavioral goals define the main outcome variables in the routine outcome measurement (ROM) for all FFT and MST teams in Norway. They focus on whether the youth (1) lives at home or in a parent-approved non-institutional setting, (2) goes to school/vocational training or has a job, (3) is not in conflict with the law, (4) does not use drugs, and (5) abstains from threatening or committing physical violence (Strother et al., 2009). These national treatment goals are dichotomously scored as yes/no (1/0) by the treatment teams, before and after treatment based on information is obtained from the municipal Child Welfare Services, the youth, and the parent(s). Follow-up assessments (6- and 12 months) of these goals are conducted through parental telephone interviews, which add a multi-informant perspective to the assessments. In this study, re-offending was not considered eligible as a primary outcome variable, due to the relatively high age of criminal responsibility in Norway (i.e., 15 years).

The Present Study

This study investigates outcomes following MST and FFT among Norwegian youths with serious problem behaviors. In Norway, MST was implemented 7 years prior to FFT. FFT was introduced as an alternative treatment for youths with behavioral problems not eligible for MST. The study uses available ROM data that was gathered as part of the quality assurance procedures of the two programs. The following hypotheses are tested for the two programs:

**Hypothesis 1.** At intake, youths assigned to MST show more risk factors and problem behaviors compared to those assigned to FFT.

**Hypothesis 2.** Both MST and FFT show significant and positive treatment changes in YLS/CMI risk factors and treatment outcomes from intake to completion of the interventions.

**Hypothesis 3.** YLS/CMI risk factors relate to the accomplishment of the overall outcome goal at post-test, at 6-month follow-up and 12-month follow-up.

Method

Participants

The participants included 2471 youths who completed MST or FFT from 08.01.2013 to 07.05.2019. Among these, N = 2018 had finished MST (61.8% boys, \( M_{age} = 14.47 \)), whereas N = 453 had finished FFT (55% boys, \( M_{age} = 14.30 \)). All participants were referred to treatment by the Municipality Child Welfare and offered MST or FFT if the team supervisor approved their eligibility by each program’s and inclusion and exclusion criteria. Both treatments were carried out as single-group pre-post designs.

Data was collected in accordance with the governing law and ethical requirements in Norway at the time of data collection. A Data Protection Official was consulted before using the registered data for this study.

Measures

**Risk factors.** Risk factors were assessed using the Youth Level of Services assessment - Part I (YLS/CMI; Hoge & Andrews, 2011). The 42 items are scored on a dichotomous scale (present = 1/not present = 0), and summarized across eight subscales. The first subscale (offenses/dispositions) measures static risk, whereas the remaining subscales (family/parenting, education/employment, peer relations, substance abuse, leisure/recreation, personality/behavior, and attitudes/orientation) reflect dynamic risk factors. The Norwegian version of the YLS/CMI was translated and back-translated,
with permission from the Multi Health Systems in the United States (Jakobsen & Kornør, 2017). In the present study, we had access to subscale data only. Reliability for the total YLS/CMI scale based on subscale (not item) scores was $\alpha = .55$ in MST, and $\alpha = .68$ in FFT at intake, and $\alpha = .71$ in MST, and $\alpha = .69$ in FFT at post-test.

**National outcome goal.** The five primary outcome measures were as follows: 1) lives at home, 2) attends school or work (min 50% workload), 3) does not use violence/threats, 4) law-abiding, and 5) drug-free. Initially, all non-risk outcomes were scored “1” (else “0”), according to rigorous guidelines in order to ensure reliability. Outcome measures were collected at baseline and post-test from the youth’s therapeutic team), and at 6- and 12-month follow-up from parental interviews.

**Data Analysis**

Analyses were performed using SPSS v. 26 (IBM, 2019) and JASP v. 0.14 (JASP Team, 2020). Group differences in categorical variables were investigated using the chi-square test, whereas comparisons between treatments were examined using t-tests. Binary logistic regressions were used to determine which of the independent variables predicted achievements of all five goals over time. Model fit was assessed using Nagelkerke pseudo $R^2$, an estimate of variance explained (Steyerberg et al., 2010). Cohen’s $d$ (1992) was used to consider effect sizes (small effect: $d = 0.2–0.5$, medium effect: $d = 0.5–0.8$, and large effect $d > 0.8$).

**Results**

**Differences in Intake Characteristics**

As shown in Table 1, youths assigned to FFT received significant more treatment days compared to those receiving MST. There were more boys in the MST group than in the FFT group, but the groups were equal with regard to mean age. In addition, youths in MST showed significant more risk behaviors and they displayed higher levels of YLS/CMI risk factors compared to youths in FFT. Table 2 shows changes from intake to post-test on YLS/CMI risk factors for both treatments. In the MST group, changes ranged from $d = 0.35$, 95% CI = [0.30, 0.39] (Offenses/Dispositions) to $d = 2.01$, 95% CI = [1.94, 2.09] (family/parenting), whereas in the FFT group, changes ranged from $d = 0.15$, 95% CI = [0.06, 0.24] (offenses/dispositions) to $d = 1.52$, 95% CI = [1.38, 1.65] (family/parenting). Six of eight subscales showed changes of large effect sizes (i.e., $d > 0.8$) in MST, whereas in FFT, four of eight subscales showed changes of large effect sizes.

**Behavioral change following the interventions**

The average level of problem behaviors at intake was $M = 2.02$ for MST and $M = 0.84$ for FFT with a range from 0 to 4 (Table 3). The pattern of change is very much the same across both

| Table 1. Sample Characteristics at Intake of Treatments. |
|-------------------------------|-------------------|-------------------|
| Variable                      | MST ($n = 2018$) n (%) | FFT ($n = 453$) n (%) | MST vs FFT $p$ |
| Gender                        | 1248 boys (61.8)    | 249 (55.0)         | .007           |
| Mean age intake               | 14.47, SD = 1.59    | 14.30, SD = 1.85   | .076           |
| Mean treatment days           | 142.40, SD = 37.74  | 158.86, SD = 39.06 | .000           |
| Ethnic Norwegian              | 1747 (86.6)         | 381 (84.1)         | .097           |
| Immigrant                     | 160 (7.9)           | 35 (7.7)           |               |
| Immigrant parents             | 111 (5.5)           | 37 (8.2)           |               |
| Placed out of home            | 160 (7.9)           | 42 (9.3)           | .346           |
| Not attending school/work     | 1368 (67.8)         | 115 (25.4)         | .000           |
| Use violence/threats          | 1482 (73.4)         | 168 (37.1)         | .000           |
| Drug abuse                    | 901 (44.6)          | 35 (7.7)           | .000           |
| Criminal behavior             | 1075 (53.3)         | 55 (12.1)          | .000           |
| YLS/CMI risk levels           |                   |                   | .000           |
| Low                           | 26 (1.3)            | 92 (20.3)          |               |
| Moderate                      | 1562 (77.4)         | 349 (77.0)         |               |
| High                          | 429 (21.3)          | 12 (2.6)           |               |
| Very high                     | 1 (0)               |                   | .000           |

Note. Total risk score levels were low = 0–8, moderate = 9–22, high = 23–34, and very high = 35–42 (Hoge & Andrews, 2001). Comparisons between groups included $t$ or $\chi^2$-tests.
Table 2. Paired Sample T-Tests and Effect Sizes within Treatments.

| Risk Factor               | MST          | FFT          | Change | MST          | FFT          | Change |
|---------------------------|--------------|--------------|--------|--------------|--------------|--------|
|                           | Intake M (SD) | Post-test M (SD) | d 95% CI | Intake M (SD) | Post-test M (SD) | d 95% CI |
| 1. Offenses/dispositions  | .33 (.64)    | .14 (.41)    | .35 [0.30, 0.39] | .04 (.22)    | .01 (.09)    | .15 [0.06, 0.24] |
| 2. Family/parenting       | 3.83 (1.22)  | .99 (1.14)   | 2.01 [1.94, 2.09] | 3.43 (1.29)  | 1.52 (1.07)  | 1.52 [1.38, 1.65] |
| 3. Education/employment   | 3.79 (1.64)  | 1.23 (1.22)  | 1.55 [1.48, 1.61] | 2.54 (1.60)  | 1.26 (1.16)  | .93 [0.82, 1.04] |
| 4. Peer relations         | 1.91 (1.18)  | .84 (89)     | 1.04 [0.98, 1.09] | 1.04 (1.01)  | .55 (71)     | .57 [0.47, 0.67] |
| 5. Substance abuse        | .69 (1.05)   | .15 (47)     | .56 [0.51, 0.61] | .21 (58)     | .04 (23)     | .32 [0.23, 0.42] |
| 6. Leisure/recreation     | 1.98 (95)    | 1.00 (93)    | .99 [0.94, 1.05] | 1.41 (103)   | .82 (88)     | .77 [0.66, 0.87] |
| 7. Personality/behavior   | 4.34 (1.47)  | 1.57 (1.31)  | 1.77 [1.70, 1.84] | 3.18 (1.68)  | 1.74 (1.28)  | 1.05 [0.93, 1.16] |
| 8. Attitudes/orientation  | 2.13 (1.19)  | .69 (91)     | 1.23 [1.18, 1.29] | .95 (106)    | .50 (75)     | .51 [0.93, 1.16] |
| ∑ Risks dynamic           | 18.68 (4.47) | 6.47 (4.34)  | 2.44 [2.35, 2.52] | 12.77 (5.04) | 6.43 (4.05)  | 1.47 [1.34, 1.60] |
| ∑ Risks total             | 19.01 (4.65) | 6.61 (4.42)  | 2.41 [2.33, 2.50] | 12.81 (5.08) | 6.44 (4.05)  | 1.46 [1.33, 1.39] |

Note. Effect sizes are Cohen’s d, CI = confidence interval.

Table 3. Number (%) of Problem Behaviors over Time.

| Risk Behavior               | MST Intake (n = 1991) | MST Post-test (n = 1782) | MST 6 months (n = 1872) | MST 12 months (n = 2003) | FFT Intake (n = 451) | FFT Post-test (n = 413) | FFT 6 months (n = 401) | FFT 12 months (n = 452) |
|-----------------------------|-----------------------|--------------------------|-------------------------|--------------------------|----------------------|------------------------|------------------------|------------------------|
| Does not live home          | 160 (7.9)             | 62 (3.3)                 | 13 (0.6)                | 6 (0.3)                  | 197 (9.7)            | 31 (6.8)               | 31 (6.8)               | 31 (6.8)               |
| Does not attend school/work | 1368 (67.8)           | 224 (11.1)               | 28 (1.8)                | 301 (14.9)               | 363 (18.0)           | 39 (8.6)               | 39 (8.6)               | 39 (8.6)               |
| Uses violence/threats       | 1482 (73.4)           | 83 (4.1)                 | 18 (1.0)                | 20 (1.0)                 | 189 (9.4)            | 31 (6.8)               | 31 (6.8)               | 31 (6.8)               |
| Criminal behavior           | 1075 (53.3)           | 54 (2.7)                 | 8 (0.4)                 | 11 (0.6)                 | 131 (6.5)            | 14 (3.1)               | 14 (3.1)               | 14 (3.1)               |
| Drug abuse                  | 901 (44.6)            | 91 (4.5)                 | 8 (0.4)                 | 14 (0.7)                 | 185 (9.2)            | 15 (3.3)               | 15 (3.3)               | 15 (3.3)               |
| Mean (SD)                   | 2.02 (0.85)           | 0.84 (0.84)              | 0.23 (0.55)             | 0.15 (0.46)              | 0.47 (0.85)          | 0.30 (0.70)            | 0.53 (0.94)            | 0.29 (0.66)            |
| Range                       | 0–4                   | 0–4                      | 0–3                     | 0–5                      | 0–5                  | 0–5                    | 0–5                    | 0–5                    |

Table 4. Number of Risk at Intake, Post-test, and 12 Months Follow-up in MST and FFT.

| Risk Factor | MST Intake | MST Post-test | MST 6 months | MST 12 months | FFT Intake | FFT Post-test | FFT 6 months | FFT 12 months |
|-------------|------------|---------------|--------------|---------------|------------|---------------|--------------|---------------|
| Frequency   | n (%)      | n (%)         | n (%)        | n (%)         | n (%)      | n (%)         | n (%)        | n (%)         |
| 0           | 41 (20.0)  | 1648 (81.7)   | 1291 (64.0)  | 1365 (67.6)   | 173 (38.2) | 401 (88.5)    | 329 (72.6)   | 359 (79.3)    |
| 1           | 332 (16.5) | 296 (14.7)    | 409 (20.3)   | 401 (19.9)    | 180 (39.7) | 38 (8.4)      | 61 (13.5)    | 73 (16.1)     |
| 2           | 650 (32.2) | 52 (2.6)      | 109 (5.4)    | 141 (7.0)     | 71 (15.7)  | 12 (2.7)      | 17 (3.8)     | 10 (2.2)      |
| 3           | 653 (32.4) | 19 (0.9)      | 51 (2.5)     | 77 (3.8)      | 25 (5.5)   | 2 (0.4)       | 5 (1.1)      | 9 (2.0)       |
| 4           | 315 (15.6) | 2 (0.1)       | 12 (0.6)     | 19 (0.9)      | 2 (0.4)    | 0 (0)         | 1 (0.2)      | 1 (0.2)       |
| 5           | 27 (1.3)   | 11 (0.6)      | 15 (0.7)     | 2 (0.4)       | 2 (0.4)    | 1 (0.2)       |              |               |

treatments. That is, the youths start at a certain level, drop considerably during treatment followed by some relapse 6- and 12-month follow-up. Noteworthy, at no time did the average level of problem behaviors reach the one observed at intake. Table 4 shows that 1.3% (n = 27) of the youths in MST showed all five risk behaviors at intake, whereas the same number was 0.4% (n = 20) for youths in FFT. At post-test, 81.7% (n = 1648) of youths in MST and 88.5% (n = 401) of youths in FFT had
accomplished all of the behavioral goals. Only a small percentage (0.7% in MST and 0.2% in FFT) had not achieved any of the goals at 12 months follow-up.

**YLS/CMI Assessments as Predictors**

Binary logistic regression analyses (Table 5) were conducted to determine which of the independent variables (youth age, gender, treatment days, initial YLS/CMI risk score, and change in YLS/CMI dynamic score) predicted completion of all five goals. Outcome responses were therefore collapsed to a dichotomous outcome indicating whether or not all the five behavioral goals were achieved (i.e., the ultimate treatment goal, coded as 1). In MST, gender and number of treatment days were unrelated to accomplishing the ultimate goal, at any of the time points. On the other hand, higher age consequently increased the chance of success (OR = 1.11, 95% CI = [1.07, 1.15] at post-test, OR = 1.06, 95% CI = [1.03, 1.10] at 6 months follow-up, and OR = 1.06, 95% CI = [1.03, 1.09] at 12 months follow-up, all p < .001), whereas the YLS/CMI sum score at intake predicted a lower chance of achieving the ultimate goal (OR = 0.84, 95% CI = [0.81, 0.86] at post-test, OR = 0.92, 95% CI = [0.89, 0.94] at 6 months follow-up, and OR = 0.93, 95% CI = [0.91, 0.95], at 12 months follow-up, all p < .001). Treatment change increased the chance for success at post-test (OR = 1.35, 95% CI = [1.30, 1.40], p < .001), and the follow-ups (OR = 1.14, 95% CI = [1.11, 1.17] at 6 months follow-up, and OR = 1.12, 95% CI = [1.09, 1.14] at 12 months follow-up, both p < .001). Nagelkerke $R^2$ indicated that most variance was explained at post-test ($R^2 = 0.62$). In FFT, much of the same pattern emerged (see Table 5). For example, at post-test, higher age related to a greater chance of achieving the ultimate goal (OR = 1.22, 95% CI = [1.12, 1.33], p < .001), but provided no influence at 12 months post-treatment (OR = 1.06, 95% CI = [0.99, 1.13], p = .082). A higher YLS/CMI score at intake consequently predicted a lower chance for accomplishing the ultimate goals (e.g., OR = .81, 95% CI = [0.75, 0.87], p < .001 at post-test), and treatment change increased this likelihood (e.g., OR = 1.37, 95% CI = [1.24, 1.51], p < .001 at post-test). Altogether, the variables explained some more variance in FFT (Nagelkerke $R^2 = 0.72$ at post-test) compared to MST.

**Discussion and Application to Practice**

This study evaluates treatment changes related to MST or FFT among Norwegian youths with severe problem behaviors. As hypothesized, findings showed that youths in the MST group had more risks compared to those in the FFT group. Behavioral problems and YLS/CMI risk factors were all significantly reduced after completion of both treatments and remained low at follow-up, compared to initial levels. In
addition, assessments of YLS/CMI predicted youths’ achievement of the ultimate treatment goal at post-test and 6- and 12-month follow-up. The results are in line with previous findings (Baglivio et al., 2014; Eeren et al., 2018).

With respect to the family/parenting factor, MST displayed a larger amount of change than FFT. This finding is of interest as the FFT model places a strong emphasis on decreasing negative family communications and parenting practices that are associated with behavior problems (Alexander et al., 2013; Robbins et al., 2016). The observed differences in baseline levels of behavior problems between MST and FFT may, however, relate to implementation and organizational factors, such as referral procedures and inclusion criteria. FFT was implemented in Norway to provide services for youths not reaching the threshold of behavior problems for MST eligibility; thus, the inclusion criteria for FFT include less severe behavior problems compared to MST.

The results of the regression models showed that the odds ratios for the YLS/CMI dynamic change factor to be further from 1 than the odds ratios for the total dynamic risk factors. This suggests that the degree to which treatment reduces the dynamic risk factors associated with problem behavior is a better indicator of sustained improvements in youth behavior than their initial levels of risk. The results point to the value of the YLS/CMI in predicting later youth behavior problems. Also, the findings are important for clinical practice and in support of effective research-based treatments as the ability to change important risk factors is a better indicator of long-term outcomes than the youth’s initial risk levels. Furthermore, it should be noted that the regression analyses were for the most part consistent. Across both treatments and all assessment time points, initial YLS/CMI risk level was associated with a lower chance of reaching all five goals, whereas change in the YLS/CMI risk level across treatments was associated with an increased chance of goal achievement. Number of days in treatment was consistently unrelated to the odds of reaching all treatment goals, indicating that the case-by-case assessment of when to end treatment within prescribed model parameters is not negatively influencing the odds of youth obtaining full goal achievement. The results pertaining to age was also mostly consistent, that is, an increased odds ratio for reaching the ultimate goal was observed in relation to age in all analyses apart from the 12-month follow-up in the FFT group. This suggests that older youth are more likely to show appropriate behavior on all the five treatment goals after MST and FFT. The current analyses differ from previous clinical studies by looking at predictors of full goal attainment, and increased age might relate to this.

While gender was not a predictor of full goal achievement in the MST group, the boys in the FFT group were more likely to have full goal achievement at 6- and 12-month follow-up, compared to the girls. The lack of gender effects for MST is in line with previous clinical research (Asscher et al., 2013; Skogem & Torvik, 2013; van der Stouwe et al., 2014). A previous Norwegian study of MST also showed that although girls presented a somewhat different problem profile than boys, MST seemed to be flexible and robust enough and effective for most adolescents in that sample, regardless of gender (Ogden & Amlund Hagen, 2009). Research on gender effects in FFT shows more mixed results, and a possible explanation is that boys typically show more behavior problems than girls (Eeren et al., 2018; Keyes et al., 2018; Lahey et al., 2000). We do not assume that this is due to the fact that boys are particularly influenced by gender socialization in Norway. Rather we suggest, in line with prior research, that this outcome could be the result of interaction effects between youth age and youth gender, as well as interaction effects between therapist gender and youth gender (Newberry et al., 1991; Scavenius et al., 2019).

The present study is one of few that use routine monitoring data to investigate treatment change in MST and FFT in a European context. Thus, the work adds to the potential for research using such data. The quality of these data strengthens external validity as data reflects the regular clinical practice of the programs and has a lower risk of selection bias than RCT-studies (Hodgson et al., 2007). Both treatments included large samples, which also add power to the analyses. Notable, the focus of our regression analyses were to what extent youths accomplished all five outcome goals (the ultimate goal) which a rather strict measurement as many youths accomplished several but not all outcomes.

The main limitation of the study is that both MST and FFT were carried out as single-group pre-post designs; thus, changes may also be due to, for example, maturation, history, and regression to the mean (Cook & Campbell, 1979). Furthermore, we did not have item-level data, and consequently, we were not able to estimate reliability for the YLS/CMI subscales. Some of the total-scale reliability values were below the recommended value of .70 (Cortina, 1993), which indicates variability among the eight subscales included. In future studies, item-level data should be included, and measures of internal consistency for the subscales considered. Also, acknowledging that a small percentage of the youth did not achieve all goals at follow-up, future studies should investigate these in more detail, to get a deeper picture of these youths compared to those that achieved the goals at follow-up.

Our findings show that both MST and FFT seem to reduce risk factors related to future problem behavior. Thus, both programs target and intervene on clinically relevant areas. Furthermore, the study indicates that change in the dynamic YLS/CMI risk assessment across treatments was a potent indicator of sustained improvement, which supports that the YLS/CMI can function as a guiding tool for treatment progress in MST and FFT. In addition, the results support the notion that FFT and MST can be used in combination to create tiered services, where MST targets youths at more risk and FFT provides treatment for youth not eligible for MST due to lower risk and less serious behavior problems.

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Ethical Approval
All procedures performed involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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