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Allison E. Fries 4/18/11

The Impact of Co-morbid Internalizing Problems and Stress on Multi-Systemic Therapy Treatment Outcomes in a Delinquent Population

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Abstract

With increased rates of delinquency in the adolescent population, there is a heightened demand for effective therapies directed at externalizing behaviors. However, relatively few research studies have explored the role of co-morbid internalizing problems, which are common in the delinquent population, in terms of their potential impact on therapy outcomes for these youth. The present study investigates the influence of co-morbid internalizing behavior problems on Multi-Systemic therapy (MST) treatment outcomes. It further explores the impact of co-morbid internalizing problems on stress, and stress on therapy outcomes. A sample of 185 youth participants (121 male, 64 female) were enrolled in MST treatment with their primary caregivers. Regression analyses were conducted to examine the relationships between co-morbid internalizing problems, stress, and treatment outcome. Treatment outcome was defined as changes in delinquent and externalizing behaviors. Stress was evaluated during treatment using youth reports of daily hassles and recent negative life events, and caregiver reports of total and youth-related stress. Co-morbid internalizing problems were significantly positively associated with delinquency but not externalizing problems at the conclusion of MST treatment. Though stress was found to be significantly associated with both treatment outcome measures, no support was found for stress as a mediator between co-morbid internalizing problems and treatment outcome. The study recommends incorporation of stress management techniques for the youth and caregiver participants in MST treatment protocols, along with an increased focus on stress and co-morbid internalizing behavior problems, both of which are detrimental to treatment success.

The Impact of Co-morbid Internalizing Problems and Stress on Multi-Systemic Therapy Treatment Outcomes in a Delinquent Population

Adolescent delinquency has presented a challenge to researchers attempting to discover effective ways to manage and improve children's behavior. Recent research has investigated potential variables that impact the prevalence and stability of adolescent delinquency, producing an abundance of strategies and programs designed to intervene with delinquent youth. Although few strategies have been proven to be effective in producing positive outcomes, Multi-Systemic Therapy (MST) is one of the few evidence-supported treatments for adolescent delinquents (Curtis, Ronan, & Borduin, 2004; Henggeler, Melton, & Smith, 1992; Kurtz, 2002; Ogden & Halliday-Boykins, 2004; Schoenwald, Ward, Henggeler, & Rowland, 2000). Most of the studies investigating MST have focused solely on its efficacy at reducing externalizing behavior problems, but some recent studies have included the examination of individual, familial, and contextual factors that may explain the outcomes of MST. The present study attempts to add to the literature in this area by examining the role of stress and co-morbid internalizing symptoms in predicting changes in externalizing behaviors in the context of MST.

Multi-Systemic Therapy (MST)

Recent research has discovered that treatment effectiveness for adolescent behavior problems is maximized if the intervention incorporates both community and family components (Kurtz, 2002). Multi-systemic therapy (MST) has become one of the most popular treatments for delinquent youth due to its multifaceted approach, which includes family therapy, parent training, and cognitive behavior therapy, and yields high levels of positive outcomes, despite some criticisms (Henggeler, Schoenwald, Borduin, & Swenson, 2006; Littell, 2005). The traditional treatment plan for delinquent populations is incarceration, however incarceration has

not been found to be significantly beneficial in the long term, with re-arrest rates and re-offending both being high. Henggeler, Melton, and Smith (1992) compared MST treatment and incarceration outcomes, and found that MST significantly reduced re-offending, re-arrest, and total amount of time incarcerated. The study also found that MST reduced youth aggression and increased family functioning. MST treatment has also been shown to be more effective than hospitalization, a common alternative to incarceration, for troubled adolescents (Schoenwald et al., 2000). Specifically MST reduced rates of hospitalization post-treatment and total amount of time hospitalized, as well as total amount of time spent in other treatment facilities. Not only is MST successful in reducing adolescent hospitalizations and incarcerations, but it is also a cost effective alternative to traditional methods of addressing juvenile delinquency.

Many recent studies investigating the effectiveness and breadth of MST have shown that the value of MST can be substantial. Curtis, Ronan, and Borduin (2004) conducted a meta-analysis of 11 studies evaluating MST treatments and found that overall MST significantly increased youth functioning and decreased offending. This decrease in offending rates results in less time spent in behavior management facilities, which in turn reduces the financial costs of delinquency at a societal level. The study also found that the youths' families were also functioning better after treatment intervention. MST studies have been replicated outside the United States, where researchers have also found lower rates of externalizing behavior problems at post-treatment, demonstrating the universal application of MST to the delinquent youth population (Asscher, Deković, van der Laan, Prins, & van Arum, 2007; Ogden & Halliday-Boykins, 2004).

The multi-dimensional approach of MST provides a network of resources to promote positive outcomes, however adherence to the treatment plan is vital for success. The importance

of treatment adherence has been well established in the research (Henggeler & Schaeffer, 2010; Huey, Henggeler, Brondino, & Pickrel, 2000; Schoenwald, Carter, Chapman, & Sheidow, 2008), and to ensure therapist adherence, the program design includes strict and frequent supervision meetings (Schoenwald, Brown, & Henggeler, 2000).

Ellis, Weiss, Han, and Gallop (2010) investigated the role of parental factors on therapist adherence to the MST plan. They found that therapist adherence to the treatment protocol is dependent upon parental psychopathology, expectations, and parenting practices. This finding advocates that the therapist should be aware of the parent's mental health needs and their impact on adherence to the treatment design, and incorporate into the treatment design a strategy to deal with these needs.

A large proportion of delinquency outcome studies have focused on the use of treatment programs for male adolescents only, leaving the use and effectiveness of new treatment strategies for female populations only weakly established (Schechter, 2010; Capaldi & Stoolmiller, 1999). Many studies have shown that males have higher rates of delinquent and externalizing behavior problems than females (Reitz, Deković, & Meijer, 2005). However, some researchers argue that the rates of female delinquent offending are simply under reported due to the difference in their type of offending (Aalsma & Lapsley, 2001). Regardless of prevalence rates, there is a female adolescent delinquent offender population that is in need of effective treatment. Galambos, Barker, and Almeida (2003) investigated externalizing behaviors in a mixed gender population and found that parenting styles and peer relations contributed to offending rates in both genders. These findings support the use of the multifaceted approach of MST for both males and females, due to the fact that both genders are vulnerable to the same influences on behavior. While some

studies have included male and female participants (Grimbos & Granic, 2009; Ogden & Hagen, 2009; Schoenwald et al., 2000) the gender differences in outcomes are rarely highlighted.

Ogden and Hagen (2009) attempted to bridge the research gap on gender in MST outcomes studies, by comparing the effectiveness of MST for males versus females. The study compared the outcomes of boys and girls after being enrolled in a MST treatment plan, and found that although MST reduced rates of problem behavior in both genders, there was a gender difference in terms of the type of behavior problems that was reduced. Specifically, MST was more successful at reducing the rates of externalizing problems in girls, and internalizing problems in boys. These findings demonstrate that the MST design provides adequate treatment for both boys and girls, however it does acknowledge that the treatment impact is focused on different realms of behavior problems across genders.

The Pittsburgh Girls Study (Keenan et al., 2010) is one of the few longitudinal studies of delinquent behavior that exclusively examines a female adolescent population. The findings from this longitudinal study suggest that parenting and the home environment play a crucial role in the development of delinquency in girls. These results reiterate the need for an effective and personalized treatment plan for delinquent girls that takes into account their unique needs and behavior trajectories.

Though the recent research has started to be more gender conscious in regards to outcomes, there are very few MST studies that simultaneously examine gender and other variables (i.e. co-morbid internalizing problems and stress) that have been shown to impact treatment outcome. In the field of youth delinquency, researchers have begun to include data on other diagnoses, such as depression or anxiety, in an effort to understand and better design a treatment that addresses all of the psychological problems troubling the delinquent population.

Similarly, stress and its impact on treatment outcome is gaining attention in the field (Baruch, Vrouva, & Fearon, 2009). The purpose of the current study is to take the field one step further, by simultaneously examining gender differences, co-morbid internalizing problems, and stress in the context of MST treatment for delinquency.

Co-morbid Internalizing Problems

It is not surprising that delinquency treatment research has been focused on finding an effective therapy to manage externalizing behavior problems (i.e. aggression, physical violence, truancy, theft). However, many troubled youth present with a combination of externalizing and internalizing problems. The presence of co-morbid internalizing behaviors in delinquent populations has been largely overlooked in treatment outcomes studies (Curtis, et al., 2004; Ellis et al., 2010; Henggeler et al., 1992). This lack of research raises many concerns about the effectiveness of MST style treatments in the presence of multiple behavior problems and/or diagnoses.

It has been consistently reported that adolescent males have higher rates of externalizing behavior problems compared to females, and adolescent females have higher rates of internalizing behavior problems compared to males (Aalsma & Lapsley, 2001; Hankin, 2008; Reitz et al., 2005). Unless there is direct intervention, the presence of externalizing problems in boys, and internalizing problems in girls has been found to be relatively stable over the course of adolescence (Galambos et al., 2003; Reitz et al., 2005). The enduring nature of internalizing and externalizing related problems could present serious long-term consequences for the future of these youth.

Several studies have begun to examine the association between internalizing problems and externalizing problems, in an attempt to understand the nature of co-morbid internalizing

behaviors in a clinical population. Frick and colleagues (1999) found that anxiety was significantly positively correlated with delinquency problems, and negatively correlated with callousness. This highlights the complex relationship connecting anxiety and certain aspects of delinquency and psychopathy, however the factors contributing to this relationship have not yet been established. The prevalence of co-occurring internalizing and externalizing problems has been found to be the most common syndrome combination in the adolescent population, in both clinical and community populations (Hinden, Compas, Howell, & Achenbach, 1997), with some studies suggesting similarly high rates of co-morbid internalizing problems for both genders (Ogden & Hagen, 2009).

Adolescents and children with co-occurring externalizing and internalizing problems have been found to have worse adjustment and functioning compared to controls with just one type of problem (Capaldi & Stoolmiller, 1999). It has also been shown that adolescents with co-morbid disorders are more likely to have poor social functioning and more behavior problems than internalizing only groups (Fanti & Henrich, 2010). Recent research also suggests that adolescents and children with co-occurring internalizing and externalizing problems have increased levels of stress compared to non- co-occurring groups (Rudolph et al., 2000). It is important to note that one recent study examining co-morbid disorders among adolescent delinquents suggests that MST may not be as effective at reducing delinquent behaviors in co-morbid populations (Grimbos & Granic, 2009). Given their noted potential for negative consequences, and their greater levels of treatment resistance, populations with co-occurring internalizing and externalizing disorders have a demonstrated need for interventions that are designed specifically to address their complex emotional and behavioral issues.

Stress as a Mediator of Treatment Outcome

Stressful life events are associated with increases in symptomatology of externalizing and internalizing disorders. For example, a recent longitudinal study found that negative life events predict increased symptoms for both externalizing and internalizing disorders in children (Hankin, 2008). This study also found negative inferential style to be a potential mechanism contributing to the impact of stress on internalizing problems. Increased levels of stress over time were also found to be associated with increased externalizing behavior problems.

In an attempt to explain the association between stress and behavior problems, Constance Hammen (1991) proposed the Stress Generation model. The model proposes that individuals with internalizing problems, specifically depression, experience more stress because they help generate it, creating what she calls "dependent stress." The model further states that depressed individuals generate their stress because they shape their environment, especially their social environment. Hammen tested this model and found that women with internalizing problems experienced more stress, specifically more interpersonal stress, than non-depressed women. The model proposes that stress and internalizing problems have a reciprocal relationship, which could explain the stability of internalizing symptoms over time.

Carter, Garber, Ciesla, and Cole (2006) applied the Stress Generation model to an adolescent population, to determine whether the model generalizes beyond the adult population. Their results showed support for the Stress Generation model in that adolescent behavior problems predicted daily stress, and the daily stress later predicted externalizing behavior problems. This cyclical pattern across adolescence suggests that youth with co-morbid internalizing and externalizing problems may be the most likely to generate stress in their lives.

Several studies have begun to emphasis the importance of daily hassles, a non-interpersonal stress, as an influential factor in the prediction of internalizing and externalizing

problems. Higher levels of daily hassles were found to be predictive of higher rates of internalizing symptoms 1-year later (Carter et al., 2006). The study also found that high levels of externalizing and internalizing symptoms predicted higher levels of hassles one year later, a reciprocal relationship supporting the Stress Generation model. Both stressful life events and daily hassles have been found to impact treatment outcomes in the sample that is the focus of the current study (Schechter, 2010; Brennan, Foster, Cunningham, Whitmore, & Wold, 2009), suggesting that the inclusion of several types of stress measures might be useful in the prediction of treatment outcomes.

Purpose

The present thesis derives from a longitudinal treatment study conducted by the Medical University of South Carolina, investigating potential moderators and mediators of MST treatment outcomes for delinquent adolescents. The current study attempts to address the role of co-morbid internalizing problems, stress, and gender on treatment outcomes. It is hypothesized that co-morbid internalizing behavior problems will predict worse outcomes from treatment. It is also predicted that co-morbid internalizing behavior problems will be associated with greater stress. Additionally, it is hypothesized that stress will mediate the relationship between co-morbid internalizing behavior problems and treatment outcomes. Gender will also be explored, as a moderator in all of the above hypotheses. See Figure 1 for the model of the primary hypotheses in the present study.

Method

Participants

The sample included a total of 185 youth participants and their primary caregivers at pre-treatment. The sample age was 12-18 years old, with a mean age of 15.35 (SD=1.289). Of the

sample, 121 were boys and 64 were girls. At post-treatment there were a total of 166 youth participants, 109 boys and 57 girls, resulting in an attrition rate of 10.27%. The sample was 47.57% Caucasian, 28.12% Hispanic/Spanish/Latino, 20.00% African American, 2.70% multi-racial, and 1.62% other. SES was calculated using the Hollingshead SES scale (Hollingshead, 1975), which resulted into a mean score of 18.88 (SD=11.5412). The median annual income of the sample was $25,000. Participants were referred for participation by four provider agencies in the Denver metropolitan area.

The inclusion criteria for participation included (1) youth age between 12-18 (2) referral for treatment by social services or juvenile justice courts due to delinquent behavior; substance abuse, property offense, physical assault (3) available to participate in treatment and (4) living in primary caregiver's home for at least a month prior to treatment. Youth participants gave assent and caregivers gave consent to participate in the study. This study was approved by the Institutional Review Boards at the University of Colorado, the Medical University of South Carolina, and Emory University.

Procedure

Participants were enrolled into a Multi-Systemic Therapy program, with duration of 4-8 months, and were assigned a licensed therapist, who designed them an individualized program. The program included parent training, behavior therapies, cognitive behavioral therapy, and family therapies. Each therapist was supervised to ensure adherence to the treatment plan and to ensure consistent application of the study protocols.

The youth and caregiver completed four evaluations; one at pre-treatment, two during treatment, and one at post-treatment. Research assistants trained in all study protocols and procedures administered each evaluation in the participants' home. The evaluations lasted

approximately 1-2 hours and each family received $75 compensation at the end of the session. At each evaluation the caregiver completed one self-report measure of their child's behavior and one stress measure, and the youth completed one self-report measure of their behavior and two stress measures. The participant and the caregiver completed their measures separately to promote honesty and to eliminate the potential influences of each other's presence.

Measures

Externalizing and Internalizing Behavior Problems. The Child Behavior Checklist (CBCL), completed by the primary caregiver, was used as the measure of youth internalizing problems, and one of the measures of youth externalizing behavior problems. The CBCL is a well-validated measure and has been shown to be an effective tool to measure behavior problems in children from 6 years of age to 18 years of age. It contains 113 items that measure youth's internalizing and externalizing behavior problems. The primary caregiver answered 'Not True,' 'Somewhat True,' or 'Very True' for each question, on a variety of problem behaviors (e.g., Disobedient, Defiant, Cries a lot, Feelings are easily hurt). One treatment outcome variable in this study was the CBCL raw scores for externalizing at post- treatment controlling for the CBCL externalizing score at pre-treatment. Co-morbid internalizing problems were measured using the CBCL raw scores for internalizing at pre-treatment.

In addition to the CBCL, the Self-Report Delinquency (SRD) scale was used to measure youth externalizing behavior problems. The SRD is a self-report measure completed by the youth at pre- and post-treatment. It contains 40 items describing delinquent behaviors (e,g,, Been suspended from school, Begged for money or thing from strangers). The youth reported their frequency of each delinquent behavior in the past 30 days. In this study each item on the SRD was dichotomized to 0 (absent) or 1 (present) in the last 30 days, and then the items were

summed into an SRD total score at each time point of administration. The second treatment outcome variable in this study was the SRD total score at post-treatment controlling for the SRD total score at pre-treatment.

Stress. The Recent Life Events Scale (Tiet et al., 2001) was used to measure recent life stress by evaluating stressful events that have occurred in the past 30 days. The youth participant completed the 26-item questionnaire with 'Yes' or 'No' responses to whether each event had occurred in the last 30 days (e.g., Victim of crime, violence, assault; Saw crime or accident). If they responded 'Yes,' they were asked to rate the event as 'Mostly good' or 'Mostly bad.' The recent negative life events variable was created by calculating the number of 'Mostly bad' events endorsed by the youth as occurring in the past 30 days. The recent life stress variable used in this study was the mean score obtained at the two mid-treatment assessment time points.

The Urban Hassles Index (Miller & Townsend, 2005) was also completed by the youth, as a measure of daily stress related to their community and environment. The Urban Hassles Index measures the frequency of stressful events in the last 30 days. Each youth was asked to rate how often an event occurred, 'Never,' 'Sometimes,' 'Often,' or 'Very often' on 32 items (i.e. Asked for money by drug addicts; Taken a longer way to school or work to avoid trouble). Items were summed to create a total Urban Hassles score at each time point of administration. The Urban Hassles variable used in this study was the mean score obtained at the two mid-treatment assessment time points.

The Barriers to Treatment Participation Scale (Kazdin, Holland, Crowley, & Breton, 1997) was completed by the caregiver as a measure of caregiver stress during treatment. The Barriers to Treatment Participation Scale contains 63 items, which are divided into barriers to treatment and stressors. For the purpose of this study only the 18 stressors items were used. The

caregiver answered 'Yes' or 'No' to stressors that potentially occurred to their family in the last 30 days. Of these 18 total items, 6 items represented life events in which the youth participant contributed to the stressor (i.e. My child was incarcerated). In this study we examined the mean of the two mid-treatment total caregiver stressors, as well as the mean of the two mid-treatment youth related caregiver stressors.

Results

Preliminary Analyses

See Table 1 for descriptive statistics of all measures. See Table 2 for intercorrelations between externalizing scores at pre- and post-treatment, delinquency scores at pre- and post-treatment, and internalizing scores at pre- and post-treatment. As seen in this table, all of the youth behavioral problem measures are significantly and positively correlated with the exception of self-reported delinquency at pre-treatment, which is only correlated with CBCL externalizing behaviors at pretreatment, and self reported delinquency post-treatment. A paired sample *t*-test found significant reductions in externalizing scores between pre- and post-treatment, $t(167)=9.35$, $p<.001$, and in delinquency scores between pre- and post-treatment, $t(165)=4.66$, $p<.001$. See Table 3 for intercorrelations between all stress measures. Once again, it can be seen that almost all of these measures are significantly and positively correlated, as would be expected.

Potential Confounds

In preliminary analyses, SES was not found to be significantly correlated with externalizing scores at pre- or post-treatment, internalizing scores at pre- and post- treatment, or gender. Due to the lack of associations between the primary dependent variables and SES, SES was not controlled for in the analyses.

Youth age was significantly negatively correlated with externalizing scores at pre-treatment (r=-.27, p<.001). Youth age was significantly negatively correlated with externalizing scores at post-treatment (r=-.18, p<.05). Due to these significant correlations, youth age was controlled for in all analyses.

Gender was significantly correlated with externalizing scores at pre-treatment (r=.13, p<.05) with females scoring higher than males. Female gender was also significantly positively correlated with internalizing scores at pre-treatment (r=.31, p<.001). Gender was therefore controlled for in all analyses.

Externalizing scores at pre-treatment were significantly positively correlated with externalizing scores at post-treatment (r=.68, p<.001). Therefore, pre-treatment externalizing scores were controlled in all externalizing score analyses. Delinquency scores at pre-treatment were found to be significantly correlated with delinquency scores at post-treatment (r=.31, p< .001), and were controlled for in all delinquency score analyses.

Hypotheses Testing

The first hypothesis is that co-morbid internalizing behavior problems will predict worse treatment outcomes. This hypothesis was tested using multiple regression analyses with CBCL externalizing behavior scores and self reported delinquency as the dependent measures. These analyses revealed a significant positive association between internalizing scores at pre-treatment and delinquency scores at post-treatment (β =.16, p=.04), controlling for age, gender, and delinquency scores at pre-treatment. It was found that internalizing scores at pre-treatment accounted for 2.3% of the variance in delinquency scores at post-treatment. No significant association was found between internalizing scores at pre-treatment and CBCL externalizing scores at post-treatment (β =.05, p=.50).

The second hypothesis was that co-morbid internalizing behavior problems would be associated with greater stress during treatment. Regression analyses found a significant association between internalizing scores at pre-treatment and total caregiver stress (β =.24, p=.01), controlling for age and gender. The regression showed that internalizing scores at pre-treatment accounted for 5.1% of the variance in total caregiver stress. Regression analyses also found a significant association between internalizing scores at pre-treatment and youth-related caregiver stress (β =.21, p=.01), controlling for age and gender. Internalizing scores at pre-treatment accounted for 4.0% of the variance in youth-related caregiver stress.

Additional regression analyses did not find significant associations between internalizing scores at pre-treatment and youth negative life events (β =.04, p=.69), or internalizing scores at pre-treatment and youth urban hassles (β =.15, p=.10).

The third hypothesis was that stress during treatment would mediate the relationship between co-morbid internalizing behavior problems and treatment outcome. Regression analyses were conducted to test this hypothesis and found significant associations between several stress measures and the outcome measures of CBCL externalizing problems and youth SRD (see Table 4). Though several total caregiver stress and youth-related stress were associated with internalizing scores at pre-treatment, and internalizing scores were associated with SRD scores at post-treatment, stress was not found to be a mediator as total caregiver stress and youth-related stress were not associated with SRD scores at post-treatment.

To test gender as a moderator, all analyses were conducted separately for males and females. There was no significant difference between the patterns of results for male and female subsamples, suggesting that gender did not act as a moderator in the associations between internalizing problems, stress, and treatment outcome.

Discussion

One of the primary goals of the current study was to assess the impact of co-morbid internalizing behavior problems on the efficacy of MST treatment aimed at reducing externalizing behavior problems. Results revealed that co-morbid internalizing behavior problems at pre-treatment predicted worse delinquency outcomes post-treatment. However, co-morbid internalizing problems were not associated with worse CBCL externalizing outcomes post-treatment. MST treatment was designed to reduce externalizing behavior problems (Curtis et al., 2004; Henggeler et al., 1992; Kurtz, 2002; Ogden & Halliday-Boykins, 2004; Schoenwald et al., 2000), and the results of this study suggest that co-morbid internalizing problems at pre-treatment are playing an important role in treatment success.

The specific influence of co-morbid internalizing problems could be explained by the relationship between externalizing and internalizing behaviors for some youth in the sample. For at least a subsample of the youth, externalizing behaviors could be a reaction to or expression of the co-morbid internalizing problems. In these cases then, externalizing behaviors might not be significantly reduced unless the treatment focused specifically on the internalizing problems.

Interestingly, a significant association was only found between co-morbid internalizing problems and the youth-self report delinquency measure, and not between co-morbid internalizing problems and the caregiver-report measure. This could be because the primary caregiver is unaware of a portion of the externalizing behaviors the youth is engaging in, and is therefore inaccurately reporting them. This inaccuracy of reporting could contribute to the lack of significant findings between co-morbid internalizing problems and the caregiver-reported externalizing measure. Covert antisocial behaviors (i.e. truancy, fire-setting) are examples of

externalizing behaviors the caregiver could be unaware of and therefore neglect to disclose. If this is the case, then the findings between co-morbid internalizing problems and delinquency may be a more accurate representation of the relationship between internalizing and externalizing behavior problems in general, due to the enhanced accuracy of the self-report delinquency measure.

Additionally, it was noted that delinquency scores at post-treatment were not only significantly associated with internalizing scores at pre-treatment, as mentioned above, but were also significantly positively associated with internalizing scores at post-treatment. These findings suggest that the relationship between internalizing behaviors and externalizing behaviors is not as simple or direct as assumed, and it may be possible that they are influencing each other throughout the treatment process. Regardless of the exact relationship between these two variables, it is apparent that co-morbid internalizing problems make the treatment of externalizing behavior problems more difficult.

Stress

Although stress did not act as a mediator between co-morbid internalizing problems and treatment outcome, stress was found to play a significant role in the treatment process. It was found that increased levels of stress during treatment resulted in worse delinquency and externalizing outcomes. Interestingly, treatment outcomes were significantly associated with both youth-experienced stress and caregiver-experienced stress. This suggests that stress experienced by any individual during the treatment process affects the efficacy of the treatment. This finding is consistent with the reasoning behind the structure of the MST treatment; the inclusion of the family in the therapy is key due to their influences on treatment outcome. Due to

the fact that stress, no matter who experiences it, is detrimental to treatment outcome, MST treatment needs to provide adequate stress-management techniques, above and beyond what is already incorporated into the protocol.

It could be proposed that the externalizing behavior problems are a coping mechanism, with which youth handle the pressure of stress. Therefore, an increased stress load would contribute to increased rates of externalizing behaviors. These coping mechanisms could be learned behaviors or deficient development of appropriate coping skills. If this is the case, it reiterates the need for therapeutic interventions to incorporate stress management and cognitive training.

Stress Generation

The interplay between stress and internalizing problems examined in this study originated from the Stress Generation Model proposed by Constance Hammen (1991). It was discovered that youth co-morbid internalizing and externalizing problems was associated with higher caregiver reported stress, but not higher youth reported stress. These findings do not support the Stress Generation Model, but instead suggests a relationship between youth's behavior problems and caregiver stress.

Youth internalizing behavior problems were reported by the caregiver, whose awareness of, or perception of the youth's internalizing problems could contribute to their stress. The finding that youth internalizing problems were significantly associated with youth-related caregiver stress during treatment supports this idea. Since the caregiver is aware of the internalizing problems, they could have heightened awareness of the youth-related problems they experience during treatment, which could result in a higher stress level. Additionally, this finding

was significant when controlling for externalizing behavior problems at pretreatment, which suggests that there is something specific about internalizing problems in terms of their contribution to caregiver stress.

Limitations

It should be noted that the present study lacked multiple reports of internalizing behavior problems. The findings in this study are based solely on the primary caregiver's report of the youth's internalizing problems, not a youth self-report of internalizing problems. Internalizing problems by definition are problems that are experienced internally, therefore it could be difficult for the caregiver to accurately measure and recognize internalizing problems. Youth reports of internalizing problems may also have been more strongly associated with youth reported stress.

The primary use of the Child Behavior Checklist (CBCL) measure for both youth externalizing and internalizing scores could contribute to methodological bias. During any analysis using the CBCL externalizing scores at post-treatment to measure outcome, the CBCL externalizing scores at pre-treatment were controlled for. However, when testing the association between co-morbid internalizing behavior problems and treatment outcome, the CBCL internalizing scores were tested as to their association with the CBCL externalizing scores at post-treatment, while controlling for CBCL externalizing scores at pre-treatment. This analysis produced non-significant results, and this could be due partially to the fact that when the externalizing scores are controlled for, this may be an "over-control" of the influence of internalizing problems, given the high correlation of internalizing and externalizing scores at pretreatment. Post-hoc regression analysis found a significant positive association between

internalizing scores at pre-treatment and externalizing scores at post-treatment when not controlling for externalizing scores at pre-treatment.

The structure of the current study does not include a control group with which to compare the results of the MST treatment group. Given the wealth of research already conducted on the efficacy of MST treatment (Curtis et al., 2004; Henggeler et al., 1992; Kurtz, 2002; Ogden & Halliday-Boykins, 2004; Schoenwald et al., 2000), this limitation should not hamper the credibility of the current study in terms of the issue of therapeutic improvement for the sample as a whole. Nevertheless, it does prevent us from knowing whether the changes in youth behavior over time were due specifically to MST treatment effects.

There was a disproportionate number of male to female participants in this study, which diminishes the ability to investigate gender as a moderator in the current study. Unfortunately, this is a common limitation in delinquency research, given the higher prevalence rates of male externalizing problems.

Strengths

Though the lack of multiple reporters of internalizing problems is a weakness in the present study, a major strength is the multiple reporters that contributed to all other measures assessed in the study. The use of both the primary caregiver and the youth reports provide a more complete picture of stress and treatment outcome. Not only do the multiple reporters provide more information with which to test the study's hypotheses, they also provide the opportunity to compare caregiver and youth reports. This opportunity is valuable, considering the fact that one of the reporters is a delinquent adolescent, whose honesty is not always assured. Additionally,

the multiple reporters also provide a more complete evaluation of MST treatment, because both the caregiver and youth participate in the therapeutic process.

A number of different types of stress measures were utilized in the current study, providing a more complete picture of the types of stressors that occur during treatment, and which of these may be more detrimental to treatment success. The longitudinal structure of the current study also allowed for a temporally relevant test of mediation, where the independent measure was collected at Time 1, the mediators at Time 2 and 3 and the outcomes at Time 4. The longitudinal structure also provided the opportunity to adequately evaluate the MST treatment process. The pre- and post- measures offer insight into the efficacy of the treatment, and its association with co-morbid internalizing behavior problems in the delinquent population.

Future Directions

The present study focuses on the impact of the youth's psychological state and well-being on treatment outcome and incorporates the caregiver as a reporter. However, the caregiver's psychological state at pre-, during, or post-treatment was not assessed. The results from the current study suggest that the youth's internalizing problems negatively impact treatment outcome, therefore it could be speculated that the caregiver's problems could similarly impact treatment. More specifically, the caregiver's psychological state could impact treatment adherence, outcome, and attitude due to their important role throughout the MST therapeutic process. Recent research on MST treatment has found therapy adherence to be very important to treatment outcome (Schoenwald et al, 2000), and some studies have included parental psychological state as a predictor of therapy adherence (Ellis et al., 2010). Further research would seem to be needed in this area.

The findings of the current study suggest that stress plays an important role during the therapeutic process, however the details of the stress-outcome relationship remain unclear. Future research could examine this relationship more closely by using stress levels and reports of stress as a secondary treatment outcome measure. If therapeutic interventions incorporate stress management skills and tasks into the treatment protocol, as this study suggests, then whether stress levels are altered between pre- and post-treatment would provide valuable feedback into the addition of stress management's efficacy, and its utility for the families being served by MST.

Future outcome research should also investigate the influence of the change of internalizing behavior problems over time with regards to treatment outcome measures. Understanding the relationship between internalizing and externalizing behavior problems is vital for expanding treatment outcome research to produce interventions that can adequately address both difficulties in children.

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Illustrations

Figures

Tables

Figure 1. Model of primary hypotheses

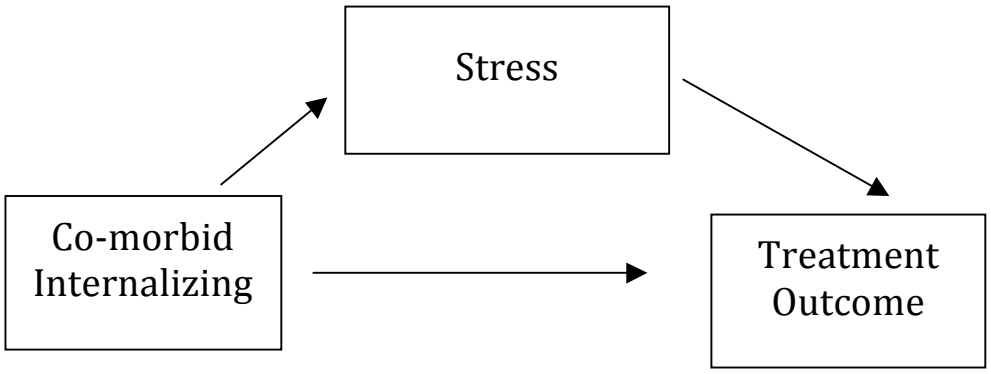

Figure1. Stress as a mediator between co-morbid internalizing problems and treatment outcome.

Table 1

Descriptive Statistics of Measures

	Mean	Standard Deviation
CBCL Externalizing Pre-	22.29	13.62
CBCL Externalizing Post-	15.32	13.19
CBCL Internalizing Pre-	12.75	8.99
CBCL Internalizing Post-	7.74	7.75
SRD Pre-	3.96	5.00
SRD Post-	2.12	3.64
Youth Urban Hassles	52.55	187.70
Youth Negative Life Events	1.29	1.62
Youth Related Caregiver Stress	.56	.76
Total Caregiver Stress	1.33	1.27

Table 2

Intercorrelations Between Outcomes and Internalizing

	1	2	3	4	5	6
1. CBCL Externalizing Pre-	-	**.65**	**.69**	**.41**	**.20**	**.29**
2. CBCL Externalizing Post-		-	**.43**	**.76**	.13	**.39**
3. CBCL Internalizing Pre-			-	**.56**	.13	**.17**
4. CBCL Internalizing Post-				-	.13	**.25**
5. SRD Pre-					-	**.31**
6. SRD Post-						-

Significant correlations are highlighted in bold.

Table 3

Intercorrelations Between Stress Measures

	1	2	3	4
1. Youth Urban Hassles	-	.05	**.19**	**.23**
2. Youth Negative Life Events		-	**.20**	**.17**
3. Youth Related Caregiver Stress			-	**.70**
4. Total Caregiver Stress				-

Significant correlations are highlighted in bold.

Table 4

Summary of Regression Analyses of Stress and Treatment Outcome: Hypothesis 3

Variable	B	*SE* B	Beta
CBCL Externalizing Post-			
Youth Urban Hassles	.00	.00	.00
Youth Negative Life Events	**1.16**	**.44**	**.17***
Youth Related Caregiver Stress	**2.52**	**.89**	**.18***
Total Caregiver Stress	**1.52**	**.53**	**.17***
SRD Post-			
Youth Urban Hassles	**<.001**	**<.001**	**.17***
Youth Negative Life Events	.34	.18	.17
Youth Related Caregiver Stress	.47	.38	.11
Total Caregiver Stress	.29	.23	.11