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The Role of Family Factors in the Outcomes of Court-Involved Youth

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Abstract

Court-involved youth (CIY) comprise a significant portion of the U.S. population and have a high prevalence of psychiatric illness and substance use. Youth delinquency has also been associated with family variables and parenting practices. However, it is not known which family factors are most relevant to behavioral outcomes in CIY mandated to outpatient mental health treatment. Self-report measures from 163 CIY (M = 15.19 years; 58.3% male) starting psychiatric care in two U.S. cities were utilized in a cross-sectional analysis to examine the association of parental monitoring and family functioning with the severity and variety of delinquent acts. Results demonstrate that parental monitoring is significantly associated with the delinquent behavior of CIY in mental health treatment, beyond that of psychiatric symptoms and substance use. Improved understanding of influential family factors can enhance tailoring of existing interventions to ensure that they are relevant to the needs of CIY, especially those in psychiatric treatment.

Keywords

Delinquency; youth; parental monitoring; psychiatric; substance use

INTRODUCTION

According to the National Center for Juvenile Justice, in 2019 approximately 700,000 youths under the age of 18 received dispositions through the juvenile court system in the

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CONFLICTS OF INTEREST

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United States (U.S.; Sickmund et al., 2020). Considering this vast number, it is important to recognize that court-involved youth (CIY) have a high prevalence of psychiatric illnesses, such as disorders of attention, anxiety, mood, substance use, and learning (Winkelman et al., 2017; Perry & Morris, 2014; Teplin et al., 2003; Shufelt & Cocozza, 2006). In addition, CIY have been shown to have an elevated risk of suicide (Coffey et al., 2003; Barnert et al., 2016; Morris et al., 1995; Kemp et al., 2016) and approximately 50% or more of study participants have endorsed engaging in substance use (Castrucci & Martin, 2002; Teplin et al., 2003; Teplin et al., 2005; Tolou-Shams at al., 2021) with cannabis being one of the most common (Morris et al., 1995; Tolou-Shams et al., 2021). Psychiatric symptoms, including difficulties with affect regulation (Brown et al., 2012), externalizing symptoms (Haney-Caron et al., 2019), and aggressive disorders (Barrett et al., 2014), have also been associated with risky and delinquent behaviors. Therefore, providing mental health treatment to CIY is a potential means by which to reduce and prevent recidivism or system re-entry, as well as reducing other morbidities associated with psychiatric disorders. Studies have demonstrated that receiving mental health treatment reduces time-to-re-offending and recidivism rates in CIY (Zeola et al., 2017; Kendall et al., 2017; Perry et al., 2019), emerging adults (Davis et al., 2015; Sheidow et al., 2016), and adults (Wallace & Wang, 2020).

Although providing mental health treatment to CIY is a critical component of recidivism prevention, these youths' psychiatric symptoms, behaviors, and justice-involvement cannot be viewed in isolation from the larger family system. As CIY are minors, their caregivers are engaged in both their home lives and in their court-appointed dispositions. Furthermore, the relationship between youth behavior and the family unit appears to be bidirectional. Namely, youth delinquency and court-involvement cause stress and strain on the family system, and the family unit itself impacts youth behavior with notable potential for buffering and improvement in outcomes. Viewing delinquency in the context of both psychopathology and family factors is consistent with the Social-Personal Framework (SPF), which has been previously utilized in interventions targeting adolescent risk behaviors (Donnenberg et al., 2018; Brown et al., 2014; Snow-Hill et al., 2021; Kendall et al., 2017). The SPF highlights that adolescent risk-taking does not occur in isolation, but rather in the setting of personal attributes, family context, peer and partner relationships, and environmental circumstances (Donnenberg et al., 2005).

In support of this theoretical framework, previous research has demonstrated relationships between family functioning, parental mental health, parenting practices, and youth behavior in CIY (Tolou-Shams et al., 2012; Tolou-Shams et al., 2018; Folk et al., 2020; Bouffard & Armstrong, 2021) and in non-court-involved populations (Donnenberg et al., 2012; Barker et al., 2019; Donnenberg et al., 2018). Findings to date have demonstrated that differences in family context, including communication, relationships, monitoring, and permissiveness, are associated with substance use, functional impairment, risky sexual behavior, psychiatric symptom burden, and response to psychosocial interventions (Barker et al., 2019). Furthermore, among CIY, impaired parent-child communication and family affective responsiveness have been shown to be related to engagement in unprotected sex and cannabis use (Tolou-Shams et al., 2012). Interventions for juvenile offenders that involve caregivers have shown promise in targeting unsafe behaviors, such as substance use and risky sex (Tolou-Shams et al., 2017) as well as re-offending (Davis et al., 2015; Sheidow

et al., 2016; Perry et al., 2019; Celinska et al., 2019; Gottfredson et al., 2018). These interventions have utilized a variety of methodologies including Multisystemic Therapy (MST; Davis et al., 2015; Sheidow et al., 2016), affect management strategies (Tolou-Shams et al., 2017), and Functional Family Therapy (FFT; Celinska et al., 2019; Gottfredson et al., 2018). Therefore, CIY's families and caregivers are an important biopsychosocial factor to consider in recidivism prevention.

While previous research has demonstrated general associations between CIY's behavior and psychosocial family factors and parenting practices, it is not known how these familial attributes relate to delinquency outcomes in youth diverted by the court to mental health treatment, which can be brief and focus solely on individual treatment. Pursuing this understanding would allow for the creation of tailored, evidence-based services that could address these key and modifiable familial factors in this population and thus, effectively prevent continued involvement and later re-entry into the justice system. Therefore, our objective was to utilize this multifaceted approach, supported by the SPF, and explore the specific roles of family functioning and parental monitoring in the severity and variety of delinquent acts by CIY at the start of their court-mandated mental health treatment. Our examination of the literature, as described above, informed our decision to specifically choose these familial constructs due to their links to youth behavior. We hypothesized that family functioning and parental monitoring would be associated with recent delinquent behaviors in youth diverted by the court to outpatient psychiatric care.

METHODS

Participants

Between November 2011 and April 2015, 598 adolescents were referred for study participation by court officials (i.e., intake worker, probation officer, magistrate, or judge) after diversion to mental health treatment. Youth were eligible if they were: 1) able to speak and read English; 2) between the ages of 11 and 17 years; 3) had an open petition with the partnering Family Court at the time of referral; and 4) residing with a legal guardian who was able to attend weekly therapy sessions. Referred adolescents were excluded if they: 1) were currently enrolled in mental health treatment; 2) had prior psychotic symptoms which necessitated intensive treatment at a higher level of care; or 3) required evidence-based care not included in the current intervention, including those charged with sexual offenses and/or carrying diagnoses of obsessive-compulsive disorder or pervasive developmental disorder. Approximately 53% (n = 317) of referred individuals were eligible to participate, among whom 54% (n = 170) provided consent. This paper utilizes data from 163 adolescents who provided valid baseline data.

Procedures

Adolescents and parents/caregivers were recruited from two eastern U.S. cities for a longitudinal randomized controlled trial (RCT) which compared standard community mental health counseling to a novel intervention that integrated mental health treatment with an HIV prevention program. Adolescent participants being diverted to the community in place of detention, were referred by the court when mental health services and evaluation were

warranted. Consent was obtained prior to participation. The Institutional Review Boards of the two participating sites approved all study protocols. Adolescents completed measures on laptop computers utilizing an audio computer-assisted self-interview (ACASI) program. For the purposes of this study, only the youths' baseline survey responses at study intake were analyzed. Study methods have been reported elsewhere and are summarized below (Tolou-Shams et al., 2018).

Measures

Independent Variables

Demographics.: Self-reported demographic data were obtained from all participants at intake, including age, gender identity, race and ethnicity as reported in Table 1.

Customary Drinking and Drug Use Record (CDDR).: The CDDR is an interviewer-administered questionnaire which assesses drug and alcohol use over the past three months as well as lifetime use (Brown et al., 1987). It examines the quantity and frequency of substance use, age of initiation, use progression, consequences of use, withdrawal symptoms, and psychological dependence. The CDDR has been shown to be both valid and reliable (r = .83 for alcohol and .92 for drugs) for use with youth from substance-using (α = .89 for alcohol and .72 for drugs) and community samples (α = .78 for alcohol and .85 for drugs; Brown et al., 1998). It was administered to adolescent participants at the baseline intake session. For the purposes of this study, the presence of youth binge drinking in the past three months was used to identify problematic alcohol use. Regarding cannabis, participants were asked if they had any use within the past three months.

Family Assessment Device (FAD).: The FAD is a 60 item self-report measure that assesses adolescents' and caregivers' current perceptions of family functioning (Epstein et al., 1983). Participants rated their families in areas such as, "We resolve most everyday problems around the house" and "There are rules about dangerous situations." Higher scores on a 4-point Likert scale indicate poorer family functioning. The FAD was developed and normed on clinical and nonclinical samples, and adequate reliability (α =.72–.92; r =.66–.76) and validity have been established (Epstein et al., 1983). In this study, the subscale of general family functioning, which was completed by adolescent participants at baseline, was used to assess the families' overall climate and behavior. It has been shown to highly correlate with the other subscales (r = .85–.88) and can be utilized as a single measure to represent overall family functioning (Kabacoff et al., 1990). This subscale has been shown to be valid and reliable in clinical and non-clinical samples (α = .83–.86; Kabacoff et al., 1990).

Parental Monitoring Questionnaire (PMQ).: The PMQ is a 24 item self-report measure that assesses adolescents' and caregivers' current perceptions of parental monitoring and sources of parental knowledge, namely parental solicitation, parental control, and child disclosure (Kerr & Stattin, 2000). Participants were asked to use a 5-point Likert scale, ranging from no/never (1) to yes/always (5), to rate how often certain parenting practices take place. Examples include, "How often do you need to have your parent's permission to stay out late on a weekday evening" and "In the last month, how often have your parents talked with the parents of your friends?" Higher scores indicate elevated levels of parental

monitoring. In this study, the parental monitoring subscale, which was completed by adolescent participants at baseline, was used in the analyses. This subscale has demonstrated good reliability (α =.82 for parents; α =.85, *r* =.83 for children) and correlates with adolescent internalizing and externalizing maladjustment, deviant peer relationships, and family discord (Kerr & Stattin, 2000).

Symptom Checklist-90-Revised and Global Severity Index (SCL-90-R; GSI).: The SCL-90-R is a 90 item self-report measure that assesses the presence and severity of mental health symptoms over the past seven days (Derogatis, 1975). It utilizes nine primary symptom dimensions, namely interpersonal sensitivity, depression, anxiety, phobic anxiety, obsessive-compulsive, somatization, hostility, paranoid ideation, and psychostimulation. Adolescent participants are asked to use a 5-point Likert scale, ranging from not at all (1) to extremely (5), to rate their level of distress related to specific symptoms over the past week. Each symptom examined is prefaced by the phrase, "How distressed were you by…" Examples of these symptoms include, "Feeling hopeless about the future" and "Feelings of panic or anxiety." The sum of these nine subscales and any additional items included are then divided by the total number of responses in order to generate the Global Severity Index (GSI). Higher scores indicate higher levels of psychiatric symptomatology and distress. The GSI has been demonstrated to be reliable and valid (α = .95; Derogatis & Melisaratos, 1983). For the purposes of this study, only the GSI obtained at baseline from the SCL-90-R was utilized when analyzing adolescent self-reported psychiatric symptoms.

Dependent Variables

National Youth Survey of Self-Reported Delinquency (NYS).: The NYS is a 40 item self-report measure designed to assess the type of delinquent acts that adolescents commit, including stealing, carrying weapons, engaging in violence, using and selling drugs, and public misconduct (Elliott et al., 1985). It also assesses how often drugs and alcohol were involved in these delinquent acts. The NYS has been shown to have acceptable reliability and validity with correlations equaling *r* = .75 for frequency and *r* = .84 for variety of acts reported with a mean coefficient of *r* = .74 (Huizinga & Elliott, 1986). This measure was administered at study intake in order to assess for lifetime engagement in delinquent behaviors prior to adjudication to mental health treatment by the court.

Delinquency Severity: Youth were divided into three delinquency severity categories based on their responses to the NYS: serious, moderate, and minor. These categories have been previously utilized and validated in the literature regarding court-involved youth population (Haney-Caron et al., 2019). Youth were placed into the serious category if they endorsed history of: 1) stealing or trying to steal a motor vehicle; 2) stealing or trying to steal something worth more than fifty dollars; 3) attacking another person with a plan to seriously hurt or kill them; 4) being involved in a gang fight; 5) selling hard drugs (i.e. heroin, cocaine, LSD); 6) having or trying to have sex with another individual against their will; 7) using force to try to steal things from others; and 8) breaking and entering into a vehicle or building. Those who did not report any of these items, but who did endorse a history of the following offenses were included in the moderate category: 1) knowingly buying, selling, or holding stolen goods; 2) hiding a weapon that was not a pocketknife; 3) selling cannabis; 4)

stealing or trying to steal something worth less than fifty dollars; 5) hitting or threatening to hit another individual; 6) taking a vehicle without permission; and 7) engaging in disorderly conduct in public. Youth were placed in the minor category if they did not report a history of committing the previously described offenses.

Delinquency variety: The variety of delinquent acts was a variable generated from the well-validated (α = .93) general delinquency subscale of the NYS, which is a summary measure consisting of the 24 items that examine a full range of delinquent acts (Elliott et al., 1985). For the purposes of this study, the item "Have you had sexual intercourse with a person who was not your serious partner when involved in a relationship?" was excluded from this subscale. This 23-item version of the general delinquency subscale has also been utilized and published in the literature (Feaster et al., 2010; Tolou-Shams et al., 2019; National Institute on Drug Abuse, 2016). Higher scores on this subscale indicate a greater number of types of delinquent acts endorsed.

Statistical Analysis—For the purposes of this investigation, only self-reported baseline responses were analyzed. The primary outcomes were severity and variety of delinquent acts. Means and standard deviations were calculated for scale scores and categorical variables. Bivariate analyses, including *t* tests, chi-square tests of independence, and analyses of variance (ANOVAs/ANCOVAs) were conducted to compare demographic and baseline variables across the delinquency severity groups and frequencies of delinquency. Bivariate correlations were used to assess the relationship between baseline measures (i.e., FAD, PMQ, GSI, CDDR), delinquency outcomes, and demographic variables. Variables that were significantly associated ($p < .05$) in the bivariate analyses were entered into regressions in order to examine the extent to which they were associated with delinquency severity (ordinal multiple logistic regression) and variety (negative binomial multiple linear regression). We specifically included psychiatric symptoms and substance use, in addition to demographic variables, in our statistical analyses and models as above in order to account for the fact that these participants were all mandated to mental health treatment. Furthermore, we also wanted to recognize for the high prevalence of psychiatric symptoms and substance use in CIY populations and the potential impacts of these factors on youth behavior (Winkelman et al., 2017; Perry & Morris, 2014; Teplin et al., 2003; Shufelt & Cocozza, 2006; Castrucci & Martin, 2002; Teplin et al., 2005; Tolou-Shams at al., 2021; Brown et al., 2012; Haney-Caron et al., 2019; Barrett et al., 2014). All analyses were done with IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, N.Y., USA).

RESULTS

Demographics

The adolescent participants ranged in age from 12 to 17 years old with an average age of 15.19 years (SD = 1.36). The majority were White (60.7%) and male (58.3%). Full demographic data is presented in Table 1.

Utilizing the NYS, 36.2% of the sample were determined to have severe delinquency, 31.3% moderate delinquency, and 32.5% minor delinquency. Regarding substance use, cannabis and alcohol were the primary substances used with only 11.7% reporting use of

other drugs. Among the participants, 38.7% reported using cannabis and 32.5% reported consuming alcohol in the past three months. Of those who drank alcohol, 73.6% (23.9% of all participants) reported engaging in binge drinking of five or more drinks at least once during the past three months.

Primary Analyses

The results of the preliminary bivariate analyses are outlined in Tables 2 and 4. There were no significant gender or racial differences in delinquency severity and variety, including when examining each race as an individual group as well as when comparing white to non-white participants. However, older age was associated with more severe forms of delinquency as well as higher variety of delinquent acts.

Delinquency Severity: The bivariate analyses (Table 2) found that those with higher severity of delinquent acts were older (F (2, 158) = 3.33, $p = .038$), had worse psychiatric symptoms (F (2, 157) = 4.45, $p = .013$), greater cannabis use (X^2 (2) = 15.15, $p = .001$), worse family functioning (F (2, 158) = 3.75, $p = .026$), and less parental monitoring (F (2, 158) = 12.14, $p < .001$). These significant variables were entered into an ordinal multiple logistic regression, with minor delinquency as the reference group (Table 3). The overall model was significant (X^2 (12) = 47.580, $p < .001$) with parental monitoring predicting serious delinquency (OR .911, $p = .001$), even after accounting for all of the other significant variables including psychiatric symptoms (OR 2.810, $p = .025$) and cannabis use (OR 4.155, $p = .004$). When examining moderate delinquency, only parental monitoring was a significant predictor (OR = .948, $p = .049$). Family functioning was not found to be a significant predictor for both serious (OR = 1.003, p = .934) and moderate delinquency (OR= .975, $p = .52$).

Delinquency Variety: Bivariate analyses outlined in Table 4 demonstrated that the variety of delinquent acts was significantly positively associated with cannabis use (t (159) = −4.30, $p < .001$). Correlations of scale scores (Table 4) indicated that psychiatric symptoms ($r = 0.359$, $p < .001$), family functioning ($r = .205$, $p = .009$), and parental monitoring ($r = -.385$, $p < .001$) were correlated with delinquency variety. Age was also positively correlated with delinquency variety ($r = .206$, $p = .009$). These variables were entered into a negative binomial multiple linear regression. The model had an acceptable fit (X^2 (145) = 113.961, $p = .786$). The model demonstrated that psychiatric symptoms (X^2 (1) = 6.681, $p = .010$), cannabis use (X^2 (1) = 5.967, $p = .015$), and parental monitoring (X^2 (1) = 10.502, $p = .001$) significantly predicted delinquency variety (X^2 (7) = 45.583, $p < .001$). Table 5 outlines the full model for all variables.

DISCUSSION

In this study, parental monitoring was significantly associated with the severity and variety of delinquent acts by youth at the start of their court-mandated mental health treatment, even after controlling for other significant factors, including psychiatric symptom burden and cannabis use. This study, which utilized a sample of CIY who met criteria for mental health treatment and were adjudicated to this level of care, demonstrates that psychiatric care

focusing solely on the youth may not be enough to promote optimal behavioral outcomes. In fact, this study suggests that clinical interventions which target parenting practices, namely parental monitoring, may provide additional benefit to this high-risk population. This is in keeping with previous literature that shows parental factors should be addressed in treatment provided to CIY in order to reduce and prevent delinquency as well as further justice system involvement (Celinska et al., 2019; Gottfredson et al., 2018; Davis et al., 2015; Sheidow et al., 2016). It is also consistent with the SPF which highlights the importance of addressing personal context, including family factors, when considering youth risk behaviors (Donnenberg et al., 2005). Family-based interventions, including MST and FFT, have been shown to be effective at improving delinquency outcomes in CIY (Sawyer & Bourduin, 2011; Davis et al., 2015; Sheidow et al., 2016; Celinska et al.; 2019; Gottfredson et al., 2018). However, these programs can be intensive both in terms of time commitments, staff support, and resources. They also may not always be feasible for family systems already under significant stress and strain as well as in a post-pandemic reality where staff shortages are commonplace. Furthermore, difficulties with insurance coverage may impact a family's ability to participate, with one study demonstrating that approximately 20% of a large sample of system-involved youth could not participate in MST due to funding issues (Vidal et al., 2017). Therefore, establishing which unique and specific familial factors and parenting practices have the most impact on youth behaviors will be useful for future intervention development to create programs that are brief and tailored, including for those in psychiatric care.

Interestingly, in this current study, parental monitoring was the only significant family factor associated with youth delinquent behavior. Family functioning, while showing some association with delinquency severity and variety at the bivariate level, was no longer significantly associated when tested in a multivariable model. While previous research involving non-justice involved youth has shown that parental monitoring can influence youth behavior (Rusby et al., 2018; Holmgren et al., 2019; Odukoya et al., 2018; Lopez-Tamayo et al., 2016; Pollak et al., 2020), studies examining CIY have shown inconsistent results. Namely, Tolou-Shams et al. (2012) demonstrated that poorer parental communication, not parental monitoring, was associated with cannabis use and unprotected sex. Furthermore, Folk et al. (2020) found that parental monitoring did not predict youth delinquency and substance use nor did it mediate the relationship between baseline parental and youth psychiatric symptoms, whereas family functioning did. However, these above studies did not directly examine outcomes of delinquency severity and variety. Moreover, Folk et al. (2020) examined prospective data and not all youth in that sample had identified mental health needs, whereas this current study utilized baseline data of youth who were referred to mental health treatment. It is possible that the importance of specific family factors, such as family functioning and parental monitoring, may depend on the needs and stage of these youths' psychiatric treatment. Therefore, it is possible that good family functioning is a necessary background upon which improved parental monitoring skills can take place or vice versa depending on the specific population of CIY being examined and/or on the stage in treatment the youth and their families are in. Furthermore, parental monitoring may have a more direct effect on our specific outcome variables than family functioning as enhanced parental supervision may reduce opportunities for delinquency.

Another family factor to consider is parental mental health. Previous research indicates that in order to target parenting practices, parental mental health must also be considered in clinical interventions. A sizeable number of parents of CIY have been shown to have their own clinically significant psychiatric symptoms (Brown et al., 2018). Parental psychiatric symptom burden has been associated with familial factors and, in turn, youth behavior. For example, parental psychiatric symptoms have been associated with worse family functioning (Folk et al., 2020), which may subsequently contribute to poorer parental monitoring (Tolou-Shams et al., 2018). Therefore, effective interventions should also refer parents for their own treatment and assist them with improving their relationship with their adolescents, general family functioning, monitoring and family climate.

Limitations

This study had several limitations. Firstly, all measures utilized were self-report measures, which may have introduced recall bias, especially for measures assessing multiple months in the past, and social desirability bias, which could have contributed to underreporting regarding substance use and delinquent acts. Additionally, for the purposes of this study, only the adolescent versions of the measures were utilized and, thus, any potential discrepancies between parent and child reports of parental practices were not addressed. However, a recent study demonstrated that while parent reports, as well as discrepancies between youth and parent reports, are important predictors of youth delinquency, youth reports of parenting behaviors alone are highly predictive of delinquent behaviors (Bouffard & Armstrong, 2021). Furthermore, this study recruited a specific subset of justice-involved youth, namely CIY referred to mental health treatment in two cities in the Eastern United States, of which only 54% of those eligible to participate provided consent. Therefore, these results may not be generalizable to the CIY population at large. Additionally, this study was cross-sectional. Therefore, causal conclusions cannot be drawn from the findings and further study is warranted to assess the effects of parental monitoring on youth delinquent behavior over time. Moreover, this study did not collect data on how much time had passed from the time of crime of conviction to the time of treatment referral and diversion by the court system. Therefore, we used the NYS to assess for lifetime delinquency in the time prior to the start of court-mandated mental health treatment with the aim of capturing an overall pattern of delinquent behavior and parenting practices that were ongoing prior to treatment enrollment.

Strengths

This study did have a number of strengths, including adequate sample size and use of scales that have been validated in psychiatric populations and/or justice-involved youths. Additionally, the sample addressed in this study represents a unique group of CIY: those who have been court-mandated to mental health treatment. Examination of the factors that influence delinquent behaviors in this group is valuable because it can be utilized to inform more tailored, family-based interventions that could potentially be administered during their mental health treatment. Furthermore, this study specifically assesses adolescents' perspective of their family's functioning and parent practices, which is important to consider as we are seeking to understand the drivers of youth delinquent behaviors. We also employed categorizations of delinquency severity and variety that have previously been used

in the literature (Haney-Caron et al., 2019; Feaster et al., 2010; Tolou-Shams et al., 2019). In addition, as outlined above, our results are consistent with previous findings which highlight the importance of parental practices in youth behavioral outcomes.

Future Directions

Future research directions include examining the changes in parental monitoring and family functioning over the course of mental health treatment and how these factors predict delinquency as treatment progresses. In addition, the mechanisms that may underlie changes in parental behavior, such as emotional management and parental stress, should be examined in order to better inform clinical interventions to address these factors. Concurrently, considering the significant rates of mental health symptoms and parenting stress in the parents of CIY, (Brown et al., 2018) there is also great need for interventions that include parental mental health treatment in addition to parenting skills. Furthermore, examination of the role of addressing substance use in mental health treatment for CIY is needed when considering delinquency outcomes. In general, improved understanding of the biopsychosocial barriers and disparities faced by these youth and their families can allow for better tailoring of existing interventions to ensure that they are relevant to the needs of this population, especially those referred to psychiatric treatment.

CONCLUSIONS

This study provides evidence that mental health treatment alone is not enough to promote optimal behavioral outcomes for CIY mandated to mental health treatment. Furthermore, it demonstrates that a specific parenting practice, parental monitoring, is significantly associated with the delinquent behavior of CIY seeking mental health treatment, beyond that of psychiatric symptoms and problematic substance use. Therefore, to reduce delinquency, clinical interventions need to specifically target parental behavior and skills. Future directions for this research should include improving our understanding of the biopsychosocial barriers and disparities faced by these youth and their families and utilizing this information for better tailoring of existing family-based interventions to address the needs of CIY in psychiatric care.

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ABBREVIATIONS

ACASI	Audio Computer-Assisted Self-Interview
CDDR	Customary Drinking and Drug Use Record
CIY	Court-Involved Youth
FAD	Family Assessment Device
FFT	Functional Family Therapy
GSI	Global Severity Index
MST	Multisystemic Therapy
NYS	National Youth Survey of Self-Reported Delinquency
PMQ	Parental Monitoring Questionnaire
SCL-90-R	Symptom Checklist-90-Revised
SPF	Social-Personal Framework

REFERENCES

Barker DH, Hadley W, McGee H, Donenberg GR, DiClemente RJ, & Brown LK (2019). Evaluating the Role of Family Context Within a Randomized Adolescent HIV-Risk Prevention Trial. AIDS and behavior, 23(5), 1195–1209. 10.1007/s10461-019-02400-3 [PubMed: 30701390]

Barnert ES, Perry R, & Morris RE (2016). Juvenile Incarceration and Health. Academic pediatrics, 16(2), 99–109. 10.1016/j.acap.2015.09.004 [PubMed: 26548359]

Barrett DE, Katsiyannis A, Zhang D, & Zhang D (2014). Delinquency and Recidivism: A Multicohort, Matched-Control Study of the Role of Early Adverse Experiences, Mental Health Problems, and Disabilities. Journal of Emotional and Behavioral Disorders, 22(1), 3–15. 10.1177/1063426612470514

Bouffard LA, & Armstrong GS (2021). The influence of youth and parent reports of parental knowledge and monitoring and reporting discrepancy on high risk youth offending. Journal of adolescence, 93, 146–160. 10.1016/j.adolescence.2021.10.009 [PubMed: 34781104]

Brown SA, Creamer VA, & Stetson BA (1987). Adolescent alcohol expectancies in relation to personal and parental drinking patterns. Journal of abnormal psychology, 96(2), 117–121. 10.1037//0021-843x.96.2.117 [PubMed: 3584659]

Brown LK, Hadley W, Donenberg GR, DiClemente RJ, Lescano C, Lang DM, Crosby R, Barker D, & Oster D (2014). Project STYLE: a multisite RCT for HIV prevention among youths in mental health treatment. Psychiatric services (Washington, D.C.), 65(3), 338–344. 10.1176/appi.ps.201300095 [PubMed: 24382603]

Brown LK, Houck C, Lescano C, Donenberg G, Tolou-Shams M, & Mello J (2012). Affect regulation and HIV risk among youth in therapeutic schools. AIDS and behavior, 16(8), 2272–2278. 10.1007/s10461-012-0220-3 [PubMed: 22669595]

Brown SA, Myers MG, Lippke L, Tapert SF, Stewart DG, & Vik PW (1998). Psychometric evaluation of the Customary Drinking and Drug Use Record (CDDR): a measure of adolescent alcohol and drug involvement. Journal of studies on alcohol, 59(4), 427–438. 10.15288/jsa.1998.59.427 [PubMed: 9647425]

Brown LK, Tarantino N, Tolou-Shams M, Esposito-Smythers C, Healy MG, & Craker L (2018). Mental Health Symptoms and Parenting Stress of Parents of Court-Involved Youth. J Child Fam Stud. 27(3): 843–852. [PubMed: 29805245]

Castrucci BC, & Martin SL (2002). The association between substance use and risky sexual behaviors among incarcerated adolescents. Maternal and child health journal, 6(1), 43–47. 10.1023/a:1014316200584 [PubMed: 11926253]

Celinska K, Sung HE, Kim C, & Valdimarsdottir M (2019). An outcome evaluation of functional family therapy for court-involved youth. Journal of Family Therapy, 41(2), 251–276.

Coffey C, Veit F, Wolfe R, Cini E, & Patton GC (2003). Mortality in young offenders: retrospective cohort study. BMJ (Clinical research ed.), 326(7398), 1064. 10.1136/bmj.326.7398.1064

Davis M, Sheidow AJ, & McCart MR (2015). Reducing recidivism and symptoms in emerging adults with serious mental health conditions and justice system involvement. The journal of behavioral health services & research, 42(2), 172–190. 10.1007/s11414-014-9425-8 [PubMed: 25023764]

Derogatis L (1975). SCL-90-R (Symptom Checklist-90-Revised): Administration, scoring, and procedures manual. Minnetonka, MN: National Computer Systems.

Derogatis LR, & Melisaratos N (1983). The Brief Symptom Inventory: an introductory report. Psychological medicine, 13(3), 595–605. [PubMed: 6622612]

Donnenberg GR, Brown L, Hadley W, Kapungu C, Lescano C, & DiClemente R (2012). Family-Based HIV-Prevention for Adolescents with Psychiatric Disorders. In Pequegnat W & Bell CC (Eds.), Family and HIV/AIDS: Cultural and Contextual Issues in Prevention and Treatment (pp. 261–278). Springer.

Donenberg G, Emerson E, Mackesy-Amiti ME, & Fletcher F (2018). Sexual risk among African American girls seeking psychiatric care: A social-personal framework. Journal of consulting and clinical psychology, 86(1), 24–38. 10.1037/ccp0000270 [PubMed: 29300099]

Elliott DS, Huizinga D, & Ageton SS: Explaining Delinquency and Drug Use Beverly Hills, CA: Sage, 1985

Epstein NB, Baldwin LM, & Bishop. (1983). The McMaster Family Assessment Device. Journal of Marital and Family Therapy. Online. Available: 10.1111/j.1752-0606.1983.tb01497.x

Feaster DJ, Robbins MS, Henderson C, Horigian V, Puccinelli MJ, Burlew AK, & Szapocznik J (2010). Equivalence of family functioning and externalizing behaviors in adolescent substance users of different race/ethnicity. Journal of substance abuse treatment, 38 Suppl 1, S113–S124. 10.1016/j.jsat.2010.01.010 [PubMed: 20307791]

Folk JB, Brown LK, Marshall B, Ramos L, Gopalakrishnan L, Koinis-Mitchell D, & Tolou-Shams M (2020). The Prospective Impact of Family Functioning and Parenting Practices on Court-Involved Youth's Substance Use and Delinquent Behavior. Journal of youth and adolescence, 49(1), 238–251. 10.1007/s10964-019-01099-8 [PubMed: 31399895]

Gottfredson DC, Kearley B, Thornberry TP, Slothower M, Devlin D, & Fader JJ (2018). Scaling-up evidence-based programs using a public funding stream: A randomized trial of Functional Family Therapy for court-involved youth. Prevention Science, 19(7), 939–953. [PubMed: 30056615]

Haney-Caron E, Esposito-Smythers C, Tolou-Shams M, Lowery A, & Brown LK (2019). Mental Health Symptoms and Delinquency among Court-Involved Youth Referred for Treatment. Child Youth Serv Rev. 98: 312–318 [PubMed: 30858647]

Holmgren HG, Padilla-Walker LM, Stockdale LA, & Coyne SM (2019). Parental media monitoring, prosocial violent media exposure, and adolescents' prosocial and aggressive behaviors. Aggressive behavior, 45(6), 671–681. 10.1002/ab.21861 [PubMed: 31448436]

Huizinga D & Elliott DS (1986). Reassessing the reliability and validity of self-report delinquency measures. J Quant Criminol 2, 293–327. 10.1007/BF01064258

IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.

Kabacoff RI, Miller IW, Bishop DS, Epstein NB, & Keitner GI (1990). A psychometric study of the McMaster Family Assessment Device in psychiatric, medical, and nonclinical samples. Journal of Family Psychology, 3(4), 431–439. 10.1037/h0080547

Kemp K, Tolou-Shams M, Conrad S, Dauria E, Neel K, & Brown L (2016). Suicidal ideation and attempts among court-involved, non-incarcerated youth. Journal of forensic psychology practice, 16(3), 169–181. 10.1080/15228932.2016.1172424 [PubMed: 29142507]

Kendall AD, Emerson EM, Hartmann WE, Zinbarg RE, & Donenberg GR (2017). A Two-Week Psychosocial Intervention Reduces Future Aggression and Incarceration in Clinically Aggressive Juvenile Offenders. Journal of the American Academy of Child and Adolescent Psychiatry, 56(12), 1053–1061. 10.1016/j.jaac.2017.09.424 [PubMed: 29173739]

Kerr M, & Stattin H (2000). What parents know, how they know it, and several forms of adolescent adjustment: further support for a reinterpretation of monitoring. Developmental psychology, 36(3), 366–380 [PubMed: 10830980]

Lopez-Tamayo R, LaVome Robinson W, Lambert SF, Jason LA, & Ialongo NS (2016). Parental Monitoring, Association with Externalized Behavior, and Academic Outcomes in Urban African American Youth: A Moderated Mediation Analysis. American journal of community psychology, 57(3–4), 366–379. 10.1002/ajcp.12056 [PubMed: 27237941]

Morris RE, Harrison EA, Knox GW, Tromanhauser E, Marquis DK, & Watts LL (1995). Health risk behavioral survey from 39 juvenile correctional facilities in the United States. The Journal of adolescent health: official publication of the Society for Adolescent Medicine, 17(6), 334–344. 10.1016/1054-139X(95)00098-D. [PubMed: 8924439]

National Institute on Drug Abuse. (2016). Self-report delinquency scale. National Institutes of Health. https://datashare.nida.nih.gov/instrument/self-report-delinquency-scale

Odukoya OO, Sobande OO, Adeniran A, & Adesokan A (2018). Parental monitoring and substance use among youths: A survey of high school adolescents in Lagos State, Nigeria. Nigerian journal of clinical practice, 21(11), 1468–1475. 10.4103/njcp.njcp_15_16 [PubMed: 30417846]

Perry AE, Martyn-St James M, Burns L, Hewitt C, Glanville JM, Aboaja A, Thakkar P, Santosh Kumar KM, Pearson C, Wright K, & Swami S (2019). Interventions for drug-using offenders with co-occurring mental health problems. The Cochrane database of systematic reviews, 10(10), CD010901. Advance online publication. 10.1002/14651858.CD010901.pub3 [PubMed: 31588993]

Perry RC, & Morris RE (2014). Health care for youth involved with the correctional system. Primary care, 41(3), 691–705. 10.1016/j.pop.2014.05.007 [PubMed: 25124213]

Pollak Y, Poni B, Gershy N, & Aran A (2020). The Role of Parental Monitoring in Mediating the Link Between Adolescent ADHD Symptoms and Risk-Taking Behavior. Journal of attention disorders, 24(8), 1141–1147. 10.1177/1087054717725875 [PubMed: 28823191]

Rusby JC, Light JM, Crowley R, & Westling E (2018). Influence of parent-youth relationship, parental monitoring, and parent substance use on adolescent substance use onset. Journal of family psychology: JFP: journal of the Division of Family Psychology of the American Psychological Association (Division 43), 32(3), 310–320. 10.1037/fam0000350 [PubMed: 29300096]

Sawyer AM, & Borduin CM (2011). Effects of multisystemic therapy through midlife: a 21.9-year follow-up to a randomized clinical trial with serious and violent juvenile offenders. Journal of consulting and clinical psychology, 79(5), 643–652. 10.1037/a0024862 [PubMed: 21787045]

Sheidow AJ, McCart MR, & Davis M (2016). Multisystemic Therapy for Emerging Adults With Serious Mental Illness and Justice Involvement. Cognitive and behavioral practice, 23(3), 356–367. 10.1016/j.cbpra.2015.09.003 [PubMed: 28458504]

Shufelt JL, & Cocozza JJ (2006). Youth with mental health disorders in the juvenile justice system: Results from a multi-state prevalence study (pp. 1–6). Delmar, NY: National Center for Mental Health and Juvenile Justice.

Sickmund M, Sladky A, & Kang W (2020). "Easy Access to Juvenile Court Statistics: 1985–2018" Online. Available: https://www.ojjdp.gov/ojstatbb/ezajcs

Snow-Hill NL, Donenberg G, Feil EG, Smith DR, Floyd BR, & Leve C (2021). A Technology-Based Training Tool for a Health Promotion and Sex Education Program for Justice-Involved Youth: Development and Usability Study. JMIR formative research, 5(9), e31185. 10.2196/31185 [PubMed: 34591028]

Teplin LA, Mericle AA, McClelland GM, & Abram KM (2003). HIV and AIDS risk behaviors in juvenile detainees: implications for public health policy. American journal of public health, 93(6), 906–912. 10.2105/ajph.93.6.906 [PubMed: 12773351]

Teplin LA, Elkington KS, McClelland GM, Abram KM, Mericle AA, & Washburn JJ (2005). Major mental disorders, substance use disorders, comorbidity, and HIV-AIDS risk behaviors in juvenile detainees. Psychiatric services (Washington, D.C.), 56(7), 823–828. 10.1176/appi.ps.56.7.823 [PubMed: 16020814]

Tolou-Shams M, Brogan L, Esposito-Smythers C, Healy MG, Lowery A, Craker L, & Brown LK (2018). The role of family functioning in parenting practices of court-involved youth. Journal of adolescence, 63, 165–174. 10.1016/j.adolescence.2017.12.016 [PubMed: 29310009]

Tolou-Shams M, Brown LK, Marshall BDL, Dauria E, Koinis-Mitchell D, Kemp K, & Poindexter B (2019). The Behavioral Health Needs of First-Time Offending Justice-Involved Youth: Substance Use, Sexual Risk and Mental Health. Journal of child & adolescent substance abuse, 28(5), 291–303. 10.1080/1067828x.2020.1774023 [PubMed: 34220180]

Tolou-Shams M, Dauria E, Conrad SM, Kemp K, Johnson S, & Brown LK (2017). Outcomes of a family-based HIV prevention intervention for substance using juvenile offenders. Journal of substance abuse treatment, 77, 115–125. 10.1016/j.jsat.2017.03.013 [PubMed: 28476263]

Tolou-Shams M, Folk JB, Marshall B, Dauria EF, Kemp K, Li Y, Koinis-Mitchell D, & Brown LK (2021). Predictors of cannabis use among first-time justice-involved youth: A cohort study. Drug and alcohol dependence, 225, 108754. 10.1016/j.drugalcdep.2021.108754 [PubMed: 34051549]

Tolou-Shams M, Hadley W, Conrad SM, & Brown LK (2012). The Role of Family Affect in Juvenile Drug Court Offenders' Substance Use and HIV Risk. Journal of child and family studies, 21(3), 449–456. 10.1007/s10826-011-9498-4 [PubMed: 22661883]

Vidal S, Steeger CM, Caron C, Lasher L, & Connell CM (2017). Placement and Delinquency Outcomes Among System-Involved Youth Referred to Multisystemic Therapy: A Propensity Score Matching Analysis. Administration and policy in mental health, 44(6), 853–866. 10.1007/s10488-017-0797-y [PubMed: 28315074]

Wallace D, & Wang X (2020). Does in-prison physical and mental health impact recidivism?. SSM - population health, 11, 100569. 10.1016/j.ssmph.2020.100569 [PubMed: 32258357]

Winkelman T, Frank JW, Binswanger IA, & Pinals DA (2017). Health Conditions and Racial Differences Among Justice-Involved Adolescents, 2009 to 2014. Academic pediatrics, 17(7), 723–731. 10.1016/j.acap.2017.03.003 [PubMed: 28300655]

Zeola MP, Guina J, & Nahhas RW (2017). Mental Health Referrals Reduce Recidivism in First-Time Juvenile Offenders, But How Do We Determine Who is Referred?. The Psychiatric quarterly, 88(1), 167–183. 10.1007/s11126-016-9445-z [PubMed: 27241528]

Table 1.

Demographic data for adolescent participants.

	Count	Proportion %
Age	161	15.19
Gender Identity		
Male	95	58.3
Female	66	40.5
Race		
African American/ Black/ Haitian	10	6.1
American Indian/Alaska Native	4	2.5
Asian	6	3.7
White	99	60.7
Multiple/Other	37	22.7
Ethnicity		
Hispanic or Latinx		
Yes	37	22.7
No	122	74.8
Substance Use		
Cannabis		
Yes	63	38.7
No	30	18.4
Alcohol Use		
Yes	53	32.5
No	108	66.3
Binge Drinking		
Yes	39	23.9
No	122	74.8
Other Drug Use		
Yes	19	11.7
No	144	88.3
Delinquency Category		
Serious	59	36.2
Moderate	51	31.3
Minor	53	32.5

Table 2.

Bivariate associations between psychosocial variables and prior delinquency severity

Variables	Delinquency Severity					
	Total	**Serious**	**Moderate**	**Minor**	**Test Statistic**	***p***
	N= 163	**N= 59**	**N=51**	**N=53**		
	N (%)	***N (%)***	***N (%)***	***N (%)***	x^2	
Gender (Male)	95 (58.3)	36 (61.0)	25 (49.0)	34 (64.2)	3.44	.179
Race (BIPOC)	57 (35.0)	23 (39.0)	15 (29.4)	19 (35.8)	1.36	.507
Cannabis use	63 (38.7)	33 (55.9)	20 (39.2)	10 (18.9)	15.15	.001*
Binge drinking	39 (23.9)	22 (37.3)	13 (25.5)	4 (7.5)	.97	.691
	M (SD)	***M (SD)***	***M (SD)***	***M (SD)***	***F***	
Age	15.19 (1.36)	15.53 (1.24)	15.10 (1.32)	14.88 (1.46)	3.33	.038*
GSI	1.61 (.69)	1.80 (0.85)	1.61 (0.59)	1.42 (.50)	4.45	.013*
FAD	28.13 (6.24)	29.76 (6.65)	27.76 (5.76)	26.61 (5.82)	3.75	.026*
PMQ	30.30 (9.33)	26.47 (9.19)	30.33 (8.89)	34.71 (9.33)	12.14	< .001*
Delinquency variety	5.34 (5.28)	9.92 (5.21)	4.75 (3.29)	.83 (1.10)	85.47	< .001*

GSI- Global Severity Index; FAD- Family Assessment Device; PMQ- Parental Monitoring Questionnaire

*Significant at the $p < 0.05$ level

Table 3.

Ordinal multiple logistic regression analysis of psychosocial variables and prior delinquency severity

Variable	AOR	95% Confidence Interval	*p*
Serious			
Age	1.149	.816 – 1.617	.427
Gender	.815	.306 – 2.167	.681
Cannabis use	4.155	1.578 – 10.936	.004*
GSI	2.810	1.142 – 6.914	.025*
PMQ	.911	.861 – .963	.001*
FAD	1.003	.925 – 1.088	.934
Moderate			
Age	1.020	.748 – 1.391	.900
Gender	1.891	.782 – 4.573	.520
Cannabis use	2.374	.908 – 6.204	.078
GSI	1.890	.773 – 4.623	.163
PMQ	.948	.899 – 1.000	.049*
FAD	.975	.902 – 1.063	.520

AOR- Adjusted Odds Ratio; GSI- Global Severity Index; FAD- Family Assessment Device; PMQ- Parental Monitoring Questionnaire

*Significant at the $p < 0.05$ level

Table 4.

Bivariate analyses between variables and prior delinquency variety

	Delinquency Variety		
t Tests	***M (SD)***	***t***	***p***
Gender			
Male	5.13 (4.99)	−.82	.415
Female	5.81 (5.67)		
Race			
White	28.17 (47.16)	1.01	.313
BIPOC	19.84 (22.71)		
Binge Drinking			
Yes	9.08 (6.09)	−.48	.633
No	8.14 (6.68)		
Cannabis Use			
Yes	7.65 (5.85)	−4.30	< .001*
No	3.97 (4.32)		
Correlations		r^2	*p*
Age		.206	.009*
GSI		.359	< .001*
FAD		.205	.009*
PMQ		−.385	< .001*

GSI- Global Severity Index; FAD- Family Assessment Device; PMQ- Parental Monitoring Questionnaire

*Significant at the $p < 0.05$ level

Table 5.

Negative binomial multiple linear regression of psychosocial variables and prior delinquency variety

Model	B	SE	x^2	95% Confidence Interval	*p*
(Intercept)	.517	1.358	.145	−2.144 – 3.179	.703
Age	.041	.076	.298	−.107 – .189	.585
Gender	−.162	.223	.526	−.599 – .275	.468
Race	.327	.211	2.403	−.086 – .740	.121
GSI	.406	.157	6.681	.098 – .714	.010*
Cannabis Use	.512	.210	5.967	.101 – .922	.015*
PMQ	−.044	.013	10.502	−.070 – −.017	.001*
FAD	.001	.017	.004	−.032 – .034	.953

GSI- Global Severity Index; FAD- Family Assessment Device; PMQ- Parental Monitoring Questionnaire

*Significant at the $p < 0.05$ level