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Criminal Offense Charges in Women: A 10-year Follow-up of an RCT of Treatment Foster Care Oregon --Manuscript Draft--

Manuscript Number:	CCP-2022-0098R1
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Abstract:	<p>Objective: The prevention of delinquency can have long-term benefits for both the individual and society. Previous work has demonstrated positive effects of Treatment Foster Care Oregon (TFCO) on reducing delinquency across a two-year period for adolescent females involved in the juvenile justice system. The current study examined whether the effects of TFCO are present across a 10-year period, and whether criminal offenses accrued in the juvenile justice system mediate the association between intervention condition and cumulative criminal offenses through emerging adulthood.</p> <p>Method: The sample included 166 women (68% non-Hispanic White) who had been court mandated to out-of-home care as adolescents, randomly assigned to one of two interventions, and followed for an average of 10 years. Juvenile (< 18 years of age) and adult criminal records data were collected and coded for offense severity.</p> <p>Results: Analyses revealed a significant effect of the TFCO intervention on cumulative criminal offense charge severity across the 10-year follow-up period ($\beta = -.15, p < .05$). This effect was mediated by offenses charges that occurred after the baseline assessment and prior to age 18, as shown through a significant indirect effect, $\beta = -.09, p < .05$, suggesting the importance of reductions in juvenile delinquency on later criminal offending.</p> <p>Conclusions: Intensive out-of-home interventions that reduce juvenile offenses for youth with chronic delinquency may have sustained effects on adult criminality. Implications for prevention programs for female adolescents are discussed.</p>
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LONGITUDINAL FOLLOW-UP CRIMINALITY TFCO

Criminal Offense Charges in Women:

A 10-year Follow-up of an RCT of Treatment Foster Care Oregon

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Disclosure of financial interests: No authors have any conflicts to disclose. Analytic code is available in the online supplement. The data analyzed in the current study are not publicly available due to original consent form language restrictions but are available from the corresponding author upon reasonable request. The original clinical trial was registered in 2011 (ClinicalTrials.gov Identifier: NCT01341626). The current study was not pre-registered nor was the analysis plan pre-registered.

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Abstract

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Keywords: adolescent; longitudinal; female; delinquency; intervention

Public health significance statement: Treatment Foster Care Oregon, delivered during adolescence, can be an effective intervention to reduce cumulative offending into emerging adulthood for females. This reduction is largely driven by reductions in juvenile criminal offenses, suggesting adolescence as a key window for attaining sustained prevention effects.

Criminal Offense Charges in Women:

A 10-year Follow-up of an RCT of Treatment Foster Care Oregon

Juvenile delinquency is one of the most prevalent and costly forms of childhood psychopathology facing adolescents today. In 2019, juvenile courts in the United States processed 722,600 cases that involved juveniles charged with criminal law violations (Office of Juvenile Justice and Delinquency Prevention, 2019). Each year, the U.S. incurs an estimated \$8-\$21 billion in costs from the detention and confinement of young people and the long-term negative outcomes and consequences of such practices (Justice Policy Institute, 2020). Furthermore, juvenile delinquency poses a risk to individuals' long-term health, including overall poor adult health, depressive symptoms, and suicidal ideation in young and later adulthood (Barnert et al., 2017; Justice Policy Institute, 2020). Thus, it is important to better understand how to prevent ongoing delinquency among youth who have a history of juvenile justice system involvement.

Prevention of future delinquency among youth in the juvenile justice system is challenging given the evidence of continuity in criminal behavior from adolescence to adulthood, particularly for those who start offending at an early age (Loeber & Farrington, 2011). Aizer and Doyle (2015) found that juvenile incarceration increased the likelihood of recidivism in adulthood by rates of 22 to 26%. In the longitudinal Pittsburgh Youth Study, 52 to 57% of youth in the juvenile justice system continued to offend up to age 25 (Loeber & Farrington, 2011). The purpose of this paper is to examine cumulative criminal offense charges 10 years after the delivery of an intervention designed to prevent recidivism among adolescents with chronic and severe problems with delinquency. We use existing data from a sample of females and examined whether the Treatment Foster Care Oregon intervention (TFCO; formerly known as

Multidimensional Treatment Foster Care [MTFC]; Chamberlain, 2003) is more effective than out-of-home intervention services as usual for this population (typically, group care) in reducing criminal offenses into young adulthood.

Delinquency in Females

Delinquent behavior in girls and women has historically been understudied. Official arrest data show that proportionally, female youth have represented approximately 25 to 30% of the juvenile justice population over the last 15 years, with a current proportional rate of 28% (Hockenberry & Puzanchera, 2021). Furthermore, since 1980, the growth rate for adult females incarcerated in the United States has been double that of the growth rate for incarcerated males, increasing by more than 700% (The Sentencing Project, 2020). The distinct considerations facing the females involved and criminal justice service providers warrant their own study (Leve & Chamberlain, 2004; Moffitt & Caspi, 2001; Silverton & Frick, 1999). For example, although most risk and protective factors for delinquency are common to males and females, compared to their male counterparts, females involved in the juvenile justice system have typically experienced more maltreatment, more caregiver transitions, more run-away experiences, and earlier puberty (Leve et al., 2015). There is also a service gap, with females with conduct problems receiving mental health and social services less frequently than their male counterparts (Merikangas et al., 2010). The challenges in service access highlight the urgent need to understand whether existing programs, such as TFCO, help meet the needs of justice-involved girls and women by supporting them in desistance. This service gap has been recognized at the federal level through actions such as the reauthorization of the Juvenile Justice and Delinquency Prevention Act (JJDP), which calls for a focus on the needs of justice-involved girls.

Continuity in Delinquency from Adolescence to Adulthood

Several longitudinal studies have examined the likelihood of entry into the adult justice system given prior involvement in the juvenile justice system. This research generally supports an early-onset life course-persistent model, with adult offending associated with juvenile justice system involvement (Patterson & Yoerger, 1999; Piquero & Buka, 2002) and with earlier age at first offense (Benda et al., 2001). The limited evidence on recidivism among females involved in the juvenile justice system suggests that they are likely to continue to be involved in the adult criminal justice system as young adults (Cauffman, 2008; Henneberger et al., 2014), with early-onset offending being a significant predictor of later recidivism (Mahoney & Karatzias, 2012). For instance, Benda et al. (2001) found that approximately 75% of the females who were released from serious offender programs had entered the state's adult correctional system within the following 2 years. Similarly, in a prospective study of youth released from state juvenile correctional facilities, Colman et al. (2009) found that 81% of the females had been arrested on adult charges at least once, 69% were convicted, and 32% were incarcerated as an adult by age 28. These studies suggest the importance of identifying interventions that can disrupt the pathway from adolescent to adult delinquency in females.

Interventions that Prevent Juvenile Delinquency in Females

There are few research studies evaluating interventions for females in the juvenile justice system. We identified just four interventions that have been tested in multiple randomized controlled trials with male and female adolescents in the juvenile justice system: Functional Family Therapy (FFT; Alexander & Parsons, 1982), Multisystemic Therapy (MST; Henggeler et al., 2009), TFCO (Chamberlain, 2003), and Multidimensional Family Therapy (MDFT; Liddle et al., 2004). These four interventions have each shown positive effects on reducing delinquency, including girls' delinquency, and have been evaluated in several meta-analyses (Drake et al.,

2009; Lipsey, 2009), in journal reviews (Eyberg et al., 2008), and in books about EBPs (Greenwood, 2007; Howell, 2008). They share five key features, as noted by Henggeler and Schoenwald (2011) and Leve et al. (2015): (a) they are family-based treatment models; (b) they emphasize risk and protective factors; (c) they use behavioral interventions to target a constellation of problem behaviors, including delinquency, mental health symptoms, and health-risking behaviors; (d) they are implemented within the youth's natural community environment; and, (e) they use highly specified and manualized intervention procedures, and the intervention implementation is closely monitored to achieve model fidelity. In this paper, we focus on the TFCO program and examine its association with criminal offenses across a 10-year period.

TFCO was designed as an alternative to residential care or incarceration for juvenile justice-involved adolescents. Evidence from randomized clinical trials (RCTs) suggests that TFCO is effective in reducing female adolescent's delinquency, deviant peer affiliation, depressive symptoms, and pregnancy (Chamberlain et al., 2007; Harold et al., 2013; Kerr et al., 2009; Leve et al., 2005; Van Ryzin & Leve, 2012). Most relevant to the current study is TFCO's previously identified effect on delinquency in a 24-month follow-up study (Chamberlain et al., 2007). In that study, females randomly assigned to TFCO had lower scores on a delinquency construct that included time spent in locked settings, number of criminal referrals, and self-reported delinquency 24 months later, compared to females assigned to the control out-of-home care intervention. At the 24-month assessment, the average age of participants was 17 years old (range = 15 – 19 years); no study has yet tested whether the effects of TFCO on female's delinquency extend into adulthood.

Adolescence and Emerging Adulthood as Distinct and Pivotal Developmental Periods

Developmental science suggests that adolescence may be a particularly potent time to deliver interventions that have the potential for sustained effects. It is a developmental period marked by fast-paced behavioral, cognitive, and social change (National Academies of Sciences, Engineering, and Medicine, 2019). Sensation seeking, reward sensitivity, and susceptibility to peer influences increase, as do risk behaviors such as illegal drug use, criminal activity, and risky sexual behavior (Albert et al., 2013; Arnett, 1992). Growing evidence from brain imaging studies also indicates that high neuroplasticity and changes in cognitive processing during adolescence make teens both more vulnerable to negative social-affective experiences, as well as more likely to have greater flexibility adjusting motivational and goal priorities (Crone & Dahl, 2012). The juvenile justice system was designed to include a rehabilitation focus, and offense records can be expunged following release. Together, these qualities of adolescence and the juvenile justice system provide an opportunity for recovery and starting anew.

As individuals exit the juvenile justice system and enter their late teens, they move into emerging adulthood. Their criminal offenses are now processed by the adult justice system, which has a punitive emphasis rather than a restorative one. In addition, emerging adulthood, roughly ages 18 to 25, is a time of relative freedom from prescribed social roles and expectations and may offers opportunity for identity exploration before settling into adult expectations of stable relationships and careers (Arnett, 2000). Greater social approval of risk taking and decreased parental monitoring may contribute to more intense risk behaviors in emerging adulthood; and substance and behavioral addictions are most likely to be established during this period (Sussman & Arnett, 2014). For individuals who exit the juvenile justice system and do not recidivate, emerging adulthood can be empowering and serve as a turning point in one's life course.

Although most adolescents who commit offenses eventually desist from delinquent behavior (e.g., Farrington, 1986; Piquero, 2007), a subset continue to engage in criminal behavior into adulthood. Given the plasticity of the brain and social systems during adolescence, this developmental period provides a unique opportunity to deliver interventions aimed at altering behavior patterns not only in adolescence, but that are sustained into emerging adulthood and beyond. The potential for youth to recover and chart a new pathway following adolescence underpinned the rationale for the current study.

The Current Study

We sought to examine criminal offense charges across adolescence and emerging adulthood by analyzing criminal records data from a sample of females. In the original study, participants had been randomly assigned to one of two intensive out-of-home care interventions aimed at reducing delinquency: the experimental condition (TFCO) or out-of-home care treatment services as usual (TAU). We examined two primary hypotheses: (1) does assignment to the TFCO condition result in less severe lifetime criminal offense charges over a 10-year follow-up period?; (2) given the importance of the adolescent period of development, do juvenile criminal offenses (offenses under age 18) mediate the association between intervention condition and severity of lifetime cumulative criminal offense charges across the 10-year study period?

Method

Participants

The study sample included existing data from 166 females who were followed for 10 years. Information on sample size determination, data exclusions, data manipulations, and

measures included in this study is provided below.¹ Participants were 13–17 years ($M = 15.31$, $SD = 1.17$) at the start of the original study. During adolescence, girls participated in one of two consecutively run randomized controlled trials contrasting TFCO and out-of-home treatment as usual (TAU), which was typically a group care residential facility. The original trials were conducted in Oregon from 1997 to 2006 and included two cohorts of participants (Cohort 1 $n = 81$; Cohort 2 $n = 85$). In the original studies, participants were referred to the study by juvenile court judges who had mandated the youth to community-based, out-of-home treatment services because of problems with chronic delinquency and serious family adversity. Enrollment was consecutive and occurred at the time the girls were court mandated to out-of-home care. Staff attempted to enroll all referred girls in the participating county's juvenile departments who (1) were 13–17 years of age, (2) had at least one criminal referral in the past 12 months, (3) were placed in out-of-home care within 12 months following referral, and (4) were not currently pregnant (because pregnant youth were not eligible for randomization). Participants were randomly assigned to the treatment (TFCO; $n_s = 37$ and 44) and control intervention (TAU; $n_s = 44$ and 41) for Cohorts 1 and 2, respectively (see Figure 1), by the project coordinator using a coin toss. Average treatment duration was approximately 6 months and did not differ by condition. Women were approximately 25 years old when the final collection of data collection occurred. Intent to treat (ITT) analyses included the entire sample, regardless of time in the assigned treatment setting.

The ethnic breakdown of participants was: 68.1% Non-Hispanic (NH) White, 1.8% NH African American, 11.4% Hispanic, 0.6% NH Native American, 0.6% NH Asian, 16.9% multi-

¹ Data used in this study were drawn from an existing dataset. Although a power analysis was conducted to justify the original RCT sample size, we did not compute a power analysis for the current study, which uses the full sample. See the online supplement to review the original power analysis. β

ethnic/racial heritage. Less than 1% reported other or unknown ethnicity. Ethnicity was reported by participants at the follow-up young adult assessments; these percentages differ slightly from some earlier reports with this sample due to the self-report (vs. caregiver report) nature of the data used here. In comparison, 93% of the girls ages 13–19 living in the region at the time this study was conducted were NH White individuals (U.S. Department of Commerce, 1992). At baseline, 63% of girls had been living in single-parent family homes and 54% of families had an annual income of < \$10,000. All girls had been removed from their parent(s) and placed in out-of-home care settings.

Procedures

In the original study, informed consent was obtained in writing from caseworkers and youth prior to participation and was accompanied by project staff's verbal explanations of the study and its risks and benefits. All study youth and caregivers knew that they were participating in a research study and receiving treatment services. The study was conducted in compliance with the Internal Review Boards of the institutions involved in the original study.

Each girl and her parent (or other primary pre-placement caregiver) completed an in-person, 2-hr baseline assessment prior to entry into the treatment setting. Clinical and assessment staff members were independent, and the latter were blind to treatment assignment. Following the baseline assessment, follow-up assessments occurred at 6-, 12-, and 24-months post-baseline, and again across a 2.5-year period in young adulthood. One hundred and fifty-two participants (92.6% of the 164 participants still living) completed at least one of the young adult follow-up assessments. The young adult follow-up assessments began at 9.81 (1.73) and 4.69 (1.16) years ($M[SD]$) post-baseline for Cohorts 1 and 2, respectively, at which point participants were re-consented to permit the retrieval of adult court and arrest records. Juvenile justice and adult court

and arrest records collected during each adolescent assessment and at the final young adult follow-up assessment, approximately 10 years post-baseline ($M[SD]= 10.01[2.96]$), were accessed for this study. No adverse events were reported during the course of the original study.

Transparency and Openness

We use existing data and report all data manipulations and all measures in the study, and we follow JARS (Kazak, 2018). All data and research materials are available from the authors upon reasonable request. Data were analyzed using R version 3.1.2 (R Core Team, 2016) and the lavaan package (version 0.6-10; Rosseel, 2012). The original clinical trial was registered in 2011 (ClinicalTrials.gov Identifier: NCT01341626). The current study was not pre-registered nor was the analysis plan pre-registered.

Experimental Intervention

The TFCO intervention is described in detail elsewhere (Chamberlain, 2003; Chamberlain et al., 2007; Leve et al., 2011). In brief, TFCO girls were individually placed in one of 22 highly trained and supervised homes with state-certified foster parents. Across the years that the trial was conducted, each TFCO home served 1–19 study participants ($M[SD] = 3.68[4.53]$). Experienced program supervisors with small caseloads (10 TFCO families) supervised clinical staff, coordinated the youth's placement, and maintained daily contact with TFCO parents to monitor treatment fidelity and provide ongoing consultation, support, and crisis intervention services. Interventions were individualized but included all basic TFCO components: daily telephone contact with the foster parents to monitor case progress and adherence to the TFCO model; weekly group supervision and support meetings for foster parents; an individualized, in-home daily point-and-level program for each girl; individual therapy for each girl; family therapy (for the aftercare placement family) focusing on parent

management strategies; close monitoring of school attendance, performance, and homework completion; case management to coordinate the interventions in the foster family, peer, and school settings; 24-hr on-call staff support for foster and biological parents; and psychiatric consultation, as needed. In Cohort 2, the TFCO condition also included intervention components that targeted sexual-risk behaviors and substance use behaviors. Additional information about the TFCO intervention is available here: <https://www.tfcOregon.com/>

Control Intervention

TAU girls were placed in one of 35 community-based treatment programs located in Oregon that served youth referred for out-of-home care from the juvenile justice system. TAU programs represented typical treatment services for girls referred to out-of-home care by the juvenile justice system. Most were group care residential treatment centers. TAU programs had 2–83 youths in residence ($M = 13$) and 1–85 staff members ($Mdn = 9$), including clinical and medical professionals. The program philosophies were primarily eclectic (61.5%) or behavioral (38.5%); 80% of the programs reported delivering therapeutic services at least weekly. Many included on-site schooling. Chamberlain and colleagues (2007) provide additional details.

Measures

Criminal offense charges (COC). COC data were collected from juvenile justice records, state police records, circuit court data, and official arrest records during each adolescent wave and at the completion of the young adult follow-up study. In the juvenile justice system, COC are derived from the youth's criminal referrals for acts of delinquency; in the adult justice system, COC are derived from their arrest record data. For consistency, we refer to both types of offense charges as COC in this manuscript. Records were collected for 100% of participants in both the adolescent and young adult phases of the study. The original study gathered residential

history information (self-reported) from all participants, and then attempted to collect criminal record data from every county in which the participant lived for the duration of the study. We produced a complete record of each participant's official criminal records by compiling the offenses at each assessment. We then removed any duplicate offenses which occurred because of the record compilation process.

COC data were coded for severity by class of offense using a standard coding system derived from state and federal sentencing guidelines, which is similar to severity coding systems used in prior research reports (Moore & Hiday, 2006; Wickramasekera et al., 2015): 1 = status offense; 2 = Law violation/class U misdemeanor (e.g., pointing a firearm); 3 = Class C misdemeanor (e.g., third degree theft, animal abuse); 4 = Class B misdemeanor (e.g., harassment, shoplifting); 5 = Class A misdemeanor (e.g., disorderly conduct, fourth degree assault); 6 = Class U/Unclassified felony (e.g., contempt of court); 7 = Class C felony (e.g., second degree burglary, identity theft); 8 = Class B felony (e.g., attempted arson, second degree assault); 9 = Class A felony (e.g., first degree robbery, first degree assault). Based on this severity coding system, *Post-Baseline Cumulative COC* were computed as the sum of severity of each criminal referral post-baseline. *Under 18-years (U18) COC* were computed as the sum of severity of each criminal referral that occurred after baseline and before the participant's 18th birthday. Both COC variables were significantly skewed, and thus a log transformation was performed prior to model-fitting analyses were conducted. COC have been found to be reliable indicators of externalizing behavior (Capaldi & Stoolmiller, 1999).

Intervention condition. Intervention condition was computed as follows: 0 = TAU, 1 = TFCO.

Control variables. To control for initial levels of delinquency, *Pre-baseline COC* were computed as the sum of severity of each COC that occurred before baseline. In addition, to control for the fact that the study was comprised of two cohorts that had different study lengths, we measured the time (in days) between baseline and final follow-up when the court records were collected and include *Time to Follow-up* as a control variable.

Analytic Plan

Path analysis was implemented to examine the effects of the TFCO intervention in two ways: 1) we examined the direct effect of TFCO on the cumulative COC post-baseline (i.e., in the 10 years post-baseline), and 2) we tested whether TFCO's potential long-term effects were mediated by U18 COC (charges before youth age 18 years old). Path analyses were estimated using the lavaan package (version 0.6-10; Rosseel, 2012) in R version 3.1.2 (R Core Team, 2016) and the maximum-likelihood estimator with Huber-White robust standard errors. Overall model fit was determined using multiple model fit indices: chi-square (χ^2), comparative fit index (CFI), and root mean square error of approximation (RMSEA). Models adequately fit when CFI values were greater than .95, RMSEA values were less than 0.08, and SRMR values were less than .08 (Hu & Bentler, 1999).

Reliability of the mediated path was further tested through bootstrapping standard errors ($n = 1,000$ draws) and constructing 95% confidence intervals. Bootstrapped confidence intervals estimated the population distribution of possible unstandardized parameter estimates based on random draws from the analysis sample. Bootstrapping was used to test indirect effects, which is considered a superior test of indirect effects compared to other methods (see MacKinnon et al., 2004). Analytic code is available in the online supplement. The data analyzed in the current

study are not publicly available due to original consent form language restrictions but are available from the corresponding author on reasonable request.

Results

Descriptive Statistics

Table 1 presents the raw COC data by class type. As indicated in the table, there was a high frequency of both misdemeanors and felonies, with over 90% of the sample having at least one Class A misdemeanor and over 80% having at least one Class C felony since the baseline assessment. Table 2 presents means and standard deviations for actual, severity weighted, and severity weighted and log transformed variables by intervention condition and for the combined sample. The severity weighted and log transformed data were used in the path modeling; all variables are included in the table to aid in interpretation of the findings. Examination of the means by intervention condition supported the hypothesis that there would be both shorter-term and long-term intervention effects on COC, with women assigned to TFCO having approximately 1.5 fewer cumulative COC since baseline as women assigned to TAU. This difference was maintained using the severity weighted data ($M = 48.14$ and 41.90 for TAU and TFCO women, respectively).

An independent-sample t-test was conducted to compare pre-baseline COC and the amount of time from baseline to follow-up by intervention condition assignment. There were no differences as a function of intervention condition: $t[164] = 0.83$, *ns*, and $t[164] = -0.91$, *ns*, respectively. As anticipated, this indicates that there were no group differences by intervention condition on the baseline or control variables.

As shown in Table 3, the correlations among study variables (severity weighted and log transformed COC data) indicated that intervention condition was negatively associated with U18

COC ($r = -.17, p < .05$) and the association between the intervention condition and post-baseline cumulative COC was negative but statistically non-significant ($r = -.15, p = .06$) (see Table 3). This suggests that, as hypothesized, TFCO had both a shorter-term and a longer-term effect on reducing COC compared to TAU. Pre-baseline COC was positively correlated with U18 COC ($r = .22, p < .01$) and with cumulative COC ($r = .28, p < .001$). Finally, U18 COC was positively associated with post-baseline cumulative COC ($r = .63, p < .001$), indicating the potential for a mediation effect.

Direct Effect of the TFCO Intervention on Criminal Offenses Through Young Adulthood

Model 1 estimated the direct effect of TFCO on cumulative COC in the 10 years post-baseline ($M[SD] = 10.01[2.96]$), while controlling for pre-baseline COC and the amount of time passed since baseline (see Figure 2). Given this path model was a saturated model, no model fit indices are presented. Random assignment to TFCO was associated with significantly lower cumulative COC, when compared to the TAU group ($\beta = -.15, p < .05, R^2 = .17$). In addition, pre-baseline COC ($\beta = .30, p < .01$) and the amount of time from baseline to follow-up ($\beta = .26, p < .01$) were also each associated with significant increases in cumulative COC from baseline to young adulthood.

Mediated Effects of the TFCO Intervention via Juvenile Criminal Offenses

Model 2 examined whether the direct effect of TFCO on cumulative COC through young adulthood was mediated by U18 COC. This analysis also controlled for pre-baseline COC and the amount of time between baseline and the young adult follow-up assessment. Fit indices suggested good model fit with the data, $\chi^2(1) = 1.54, p = .22, CFI = .99, RMSEA = 0.06, 90\% CI [0.00, 0.23], SRMR = 0.03$. As illustrated in Figure 3, the intervention effect on cumulative COC through young adulthood was significantly mediated by the intervention's impact on U18 COC

(the sum of severity of each criminal referral that occurred after baseline and before the participant's 18th birthday). Following Baron and Kenny's (1986) mediation methods, the effect of TFCO on cumulative COC was mediated because there was a significant indirect effect of the TFCO condition through U18 COC ($\beta = -.09, p < .05, 95\% \text{ CI } [-0.59, -0.03]$). Using Preacher and Kelley's (2011) approach to probing indirect effect, we also calculated the ratio of indirect effects relative to the total effect in order to assess the effect size of the mediation. This can be interpreted as the proportion of the total effect that is mediated (MacKinnon & Dwyer, 1993). The effect of the intervention on U18 COC mediated 64.09% of the total effect of assignment to the intervention condition on cumulative COC. Results presented here test the a priori theoretically driven model. Two sensitivity analyses were run. First, we ran a path mediation model including the time to follow-up as a control for U18 COC, given there was also some variation in time to follow-up for participants in the U18 COC variable depending on participant age of enrollment. Second, we ran the path mediation model including baseline age as a covariate. All results held (see online supplement).

Discussion

This study used secondary data from a longitudinal, prospective study on the lives of women who were involved in the juvenile justice system due to chronic delinquency. We found that random assignment to the TFCO condition during adolescence predicted lower severity of cumulative criminal offense charges (COC) summed from baseline until 10-years later, when participants were young adults. We also examined the mediation of these long-term intervention effects through COC scores from baseline to age 18, reflective of criminal offenses occurring when youth were in the juvenile justice system. Our results identified that U18 COC mediated the intervention effects on cumulative COC across the 10-year period, supporting our second

hypothesis. These results suggest the importance of providing supports to girls involved with the juvenile justice system to drive early reductions in offending before youth enter adulthood.

Findings from the current study document that TFCO confers benefits to women even 10-years post-baseline during young adulthood, a developmental period marked by increased risk for substance use, risky sexual behavior, and crime (Arnett, 2000). These results extend earlier findings documented at 12- and 24-months post-baseline, namely, that TFCO benefits adolescent girls by reducing delinquent behaviors (both self-report and caregiver report), the number of criminal offense charges, as well as the number of days spent in a locked setting (Chamberlain et al., 2007; Leve et al., 2005). Importantly, few longitudinal studies have followed females who have histories in the juvenile justice system from adolescence into adulthood. Those that have show that youth involved in the juvenile justice system are likely to continue offending into adulthood (Cauffman, 2008; Giordano et al., 2004; Henneberger et al., 2014). Results from the current study, which document sustained TFCO intervention effects on recidivism across nearly a decade, are valuable for policymakers and clinicians in determining how best, with the limited resources available, to support adolescent girls who have already engaged in sustained and chronic delinquency.

Clinical and Policy Implications

TFCO remains one of the only interventions tailored for girls with chronic delinquency and designed to reduce and prevent future juvenile and criminal justice involvement (Chamberlain, 2003). TFCO may be particularly effective in sustaining reductions in offending even as youth transition into adulthood because the program targets multiple risk factors that are associated with delinquency within and beyond the period of adolescence, including peer relationships, health and risk-taking behaviors, and mental health (Chamberlain, 2003). Findings

from the current study demonstrate that interventions delivered during middle to late adolescence, even once serious offending has already begun (e.g., 70% of the current sample had one felony prior to the baseline assessment), may potentially fill this service gap and have long-term benefits.

Indeed, results from the current study showed that reductions in the severity of juvenile offending (i.e., the sum of severity of each criminal offense charge that occurred after baseline and before the participant turned 18) mediated cumulative offense severity in the 10-year period to young adulthood. This finding is unsurprising given that published findings from this sample show TFCO significantly reduced offending behavior and criminal referrals at 12 and 24 months post-baseline when participants were still in adolescence (Chamberlain et al., 2007; Leve et al., 2005). Although prior research documents that females involved in the justice system are likely to continue to offend in adulthood (Cauffman, 2008; Henneberger et al., 2014), in this study, findings suggest the critical importance of promoting policies and practices that emphasize earlier intervention, and specifically, intervening with juvenile-justice involved girls during the developmental period of adolescence, to break persistence in offending into adulthood. Results obtained in this study provide evidence that intervening during adolescence (in this study, ages 13-17) led to short-term reductions in delinquency and offending that ultimately predicted lower cumulative offense severity into emerging adulthood.

These findings are also consistent with the TFCO theory of change, which largely draws from the developmental cascade theory (Masten & Cicchetti, 2010). TFCO targets the dynamic risk and protective processes that affect the continuity of offending, for example, relationship health, antisocial peer influences, educational attainment, and substance use behaviors (Chamberlain, 2003). Future studies should examine the mechanisms by which desistance in

female offending from adolescence to adulthood is observed, including the positive and protective mechanisms that contribute to desistance. Such studies have the potential to inform the next wave of prevention efforts designed to prevent delinquency in female populations.

In the current study we used official records to document criminal offense charges, which a strength of the study design. However, criminal offense charges may not always lead to being convicted of the crime for which an individual was detained, and individuals can have different sentences for similar crimes. Because we know that racial and ethnic disparities and a host of other factors (e.g., mental illness, gender, age, geographical region) influence outcomes across the spectrum from arrest to sentencing (Holland & Prohaska, 2021; Pinchevsky & Steiner, 2016), the current study is limited by only analyzing criminal offense charges. Future studies might corroborate the current study findings using multiple indicators across the spectrum engagement in the justice system, from arrests, to detention or incarceration, to sentencing length, to sentence actually served. These factors would provide a clearer understanding of how interventions can mitigate multiple forms of justice system involvement.

The results should be interpreted in light of study limitations, which include the small sample size and the predominantly White racial and ethnic composition of sample (68%), which limit generalizability. Given the disproportionate representation of minoritized youth in the justice system, it is essential that future research focuses on developing, adapting, and testing interventions to address the needs of ethnically and racially diverse youth, as there is a paucity of research assessing the effectiveness of interventions in samples of minoritized justice-involved youth (Vergara et al., 2016). One notable exception includes research on Functional Family Therapy and Functional Family Probation (Darnell & Schular, 2015), which found that the receipt of both programs in concert reduced subsequent out of home placements for a sample of

predominantly Latino/a and African American justice-involved youth. Due to the original study design with Cohort 1 and 2 enrollments occurring successively, participants may have had varying timeframes wherein they had the opportunity for criminal offenses; however, all models included time to follow-up to account for variability due to this potential time confound. However, our study design did not permit a comparison of specific treatment elements that were most effective, and there was wide variation in the TAU service components provided to participants. Future studies designed to isolate the effects of specific treatment components could increase the precision of interventions and potentially reduce their costs. Despite these limitations, this study has many strengths. Some of the strengths include the use of official arrest records, the randomized controlled trial design allowing for causal estimation of intervention effects on cumulative criminal offenses, and that the participant sample, although small, has high retention rates and is largely understudied and vulnerable, making this study an important step toward improving services to address their specific psychosocial needs.

Although researchers and policymakers increasingly recognize the importance of understanding female offending (Lynch et al., 2012; Zahn et al., 2010), there remains relatively little known about the longitudinal trajectories of female offending from adolescence to adulthood and little is known about programs that successfully intervene on patterns of persistence. Even more concerning is the field's limited understanding of what interrupts patterns of persistence for adolescent girls who have demonstrated chronic delinquency. Although TFCO is already widely disseminated in the United States and internationally, the current study adds to the literature by documenting that this evidence-based program that supports the needs of justice-involved girls now demonstrates sustained benefit in reducing the severity of criminal offenses as these individuals enter adulthood.

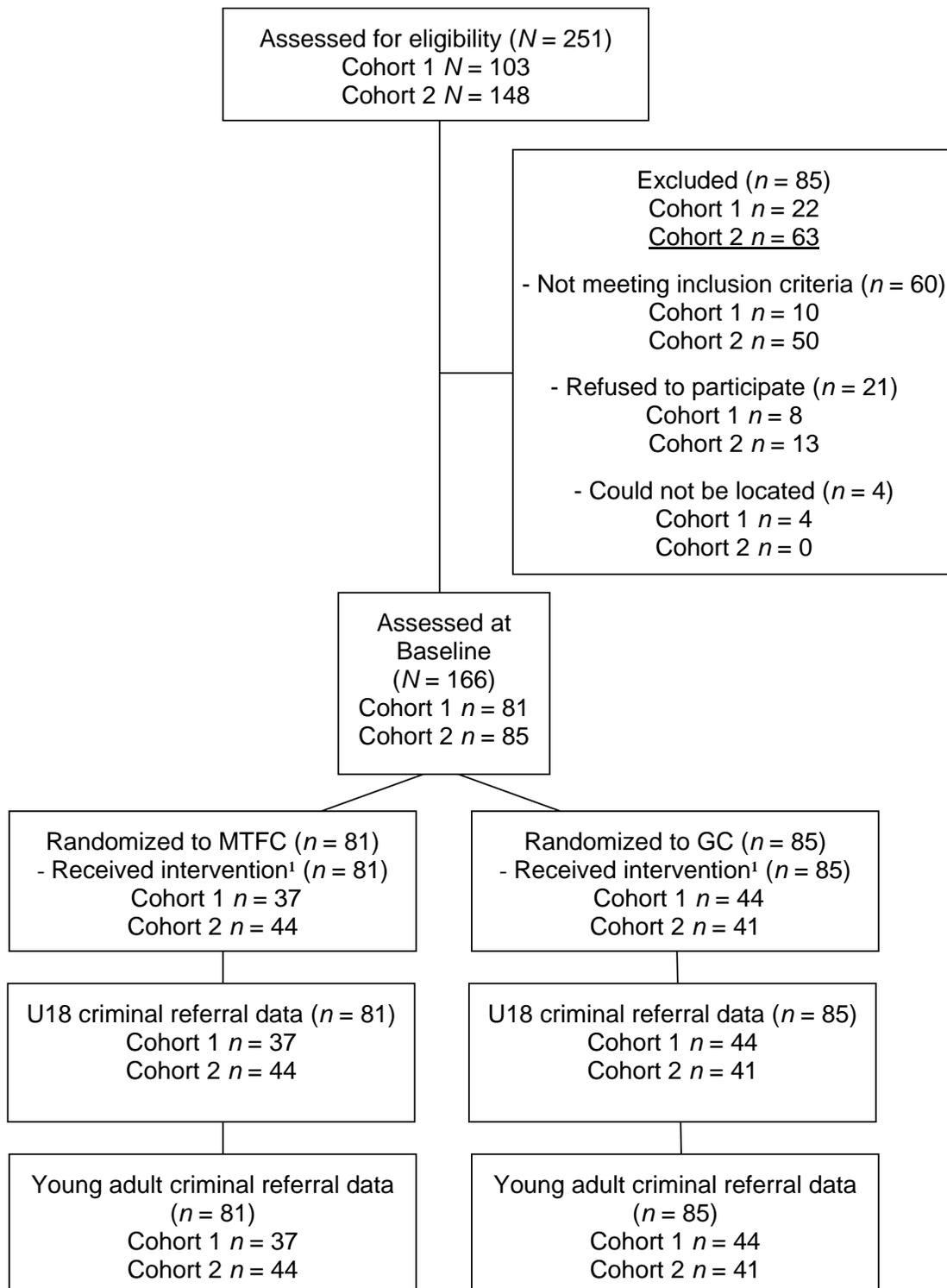


Figure 1. Consolidated Standards of Reporting Trials (CONSORT) diagram of participant flow through study recruitment, randomization to Treatment Foster Care Oregon (TFCO) or treatment as usual (TAU), and follow-up assessments. A superscript “1” indicates that some treatment services were received by all youth, though treatment length varied.

Table 1

Frequency of Criminal Referrals

Criminal Offense Charges (COC) ^a	Total Incidences Frequency	% (<i>n</i>) of Participants with Offense Class
Status Offense (1)	1090	91.60 (152)
Class U Misdemeanor (2)	117	22.30 (37)
Class C Misdemeanor (3)	406	74.10 (123)
Class B Misdemeanor (4)	223	49.40 (82)
Class A Misdemeanor (5)	1012	90.40 (150)
Class U Felony (6)	24	6.00 (10)
Class C Felony (7)	624	80.10 (133)
Class B Felony (8)	61	20.50 (34)
Class A Felony (9)	134	38.00 (63)

Note: The number following each COC indicates the severity rating. Percent of participants with offense class is based on the number of participants who have at least one occurrence of the type of criminal offense, divided by the total sample ($n = 166$).

^a Definitions of each type of offense are provided here. 1 = status offense; 2 = Law violation/class U misdemeanor (e.g., pointing a firearm); 3 = Class C misdemeanor (e.g., third degree theft, animal abuse); 4 = Class B misdemeanor (e.g., harassment, shoplifting); 5 = Class A misdemeanor (e.g., disorderly conduct, fourth degree assault); 6 = Class U/Unclassified felony (e.g., contempt of court); 7 = Class C felony (e.g., second degree burglary, identity theft); 8 = Class B felony (e.g., attempted arson, second degree assault); 9 = Class A felony (e.g., first degree robbery, first degree assault).

Table 2

Means and standard deviations for actual, severity weighted, and severity weighted log transformed study variables by intervention condition and combined sample.

Measures <i>M(SD)</i>	TAU (<i>n</i> = 85)			TFCO (<i>n</i> = 81)			Combined (<i>N</i> = 166)		
	Actual	SW	SW & LN	Actual	SW	SW & LN	Actual	SW	SW & LN
Time to Follow-Up	9.48 (2.93)	--	--	9.91 (2.98)	--	--	9.69 (2.95)	--	--
Pre-BL COC	12.28 (8.16)	44.81 (31.93)	3.63 (0.63)	12.64 (10.47)	42.19 (28.13)	3.54 (0.72)	12.46 (9.33)	43.53 (30.07)	3.59 (.67)
Post-BL U18 COC	3.48 (3.38)	12.61 (15.04)	1.89 (1.33)	2.53 (3.38)	8.96 (14.42)	1.42 (1.43)	3.02 (3.40)	10.83 (14.82)	1.66 (1.34)
Post-BL Cumulative COC	10.56 (11.41)	48.14 (61.60)	2.99 (1.28)	9.07 (14.55)	41.90 (81.04)	2.50 (1.68)	9.84 (13.02)	45.05 (71.60)	2.75 (1.64)

Note: TAU = Treatment as Usual; TFCO = Treatment Foster Care Oregon; SW = Severity Weighted; LN = Log Transformed; COC = Criminal Offense Charges; BL= Baseline.

Table 3

Correlation matrix of study variables (severity weighted and log transformed COC).

Measures	1	2	3	4	5	6
1. TFCO	-					
2. Baseline Age	.01	-				
3. Time to Follow-up	.07	-.04	-			
4. Pre-baseline COC	-.07	.16*	-.12	-		
5. Post-Baseline U18 COC	-.17*	-.40**	.05	.22**	-	
6. Post-Baseline Cumulative COC	-.15 ⁺	-.20*	.22**	.28**	.63***	-

Notes: COC = Criminal Offense Charges; TFCO = Treatment Foster Care Oregon.

⁺ $p < .06$. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

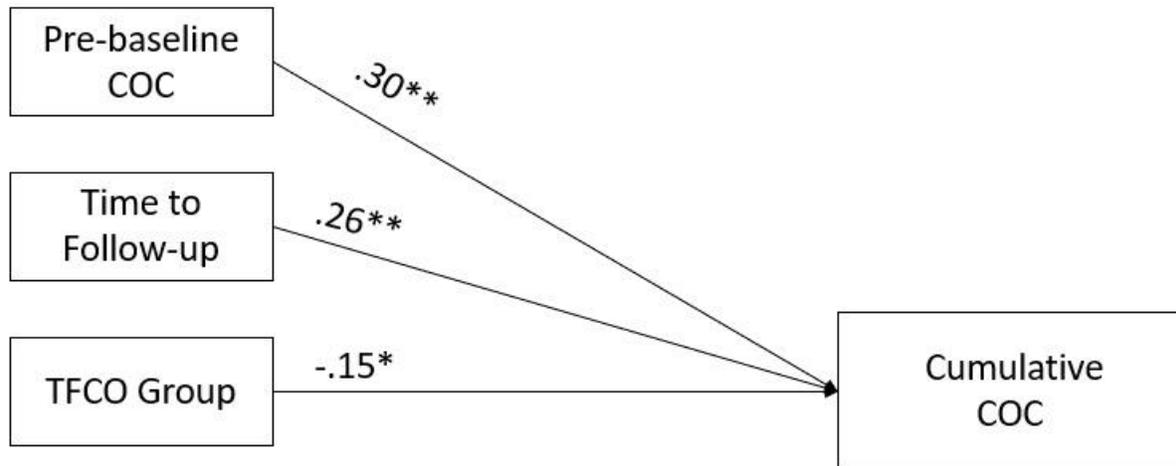


Figure 2. Path model testing the direct effect of Treatment Foster Care Oregon on young adult post-baseline criminal offense charge severity (Cumulative COC) while controlling for COC severity pre-baseline, and time since intervention (Time to Follow-up). TFCO = Treatment Foster Care Oregon. COC = Criminal Offense Charges

* $p < .05$, ** $p < .01$.

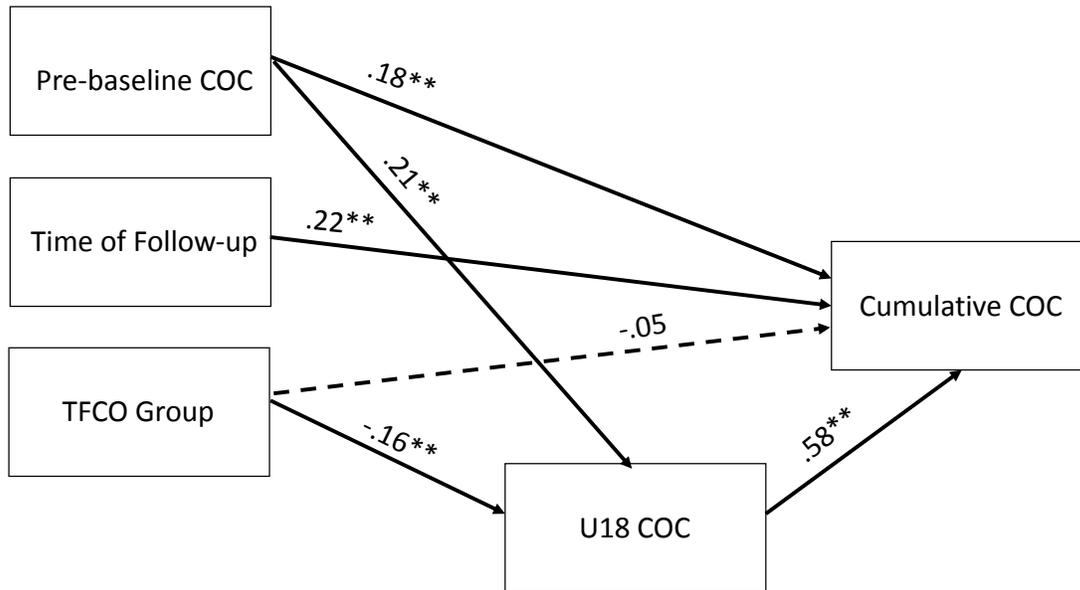


Figure 3. Path model tests the mediation of Treatment Foster Care Oregon effects on severity of young adult criminal offense charges (Cumulative COC) by severity of criminal referrals before age 18 (U18 COC). Paths are standardized coefficients. $\chi^2(1) = 1.54, p = .22$, root-mean-square error of approximation = .06, standardized root mean square residual = .03, comparative fit index = .99.

* $p < .05$, ** $p < .01$. TFCO = Treatment Foster Care Oregon. COC = Criminal Offense Charges

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Appendix: Data Transparency

Some of the data reported in this manuscript have been previously included in prior publications and were collected as part of a larger data collection. Findings from the data collection have been reported in separate manuscripts. MS1 (published, 2005) focused on criminal referrals at 12-months post-baseline in Cohort 1 only. MS2 (published, 2007) focused on criminal referrals at 24-months post-baseline in Cohort 1 only. MS1 and MS2 also included intervention condition and pre-baseline criminal referral data as predictor variables. MS3 (the current manuscript) includes criminal referral data collected at 12- and 24-months post-baseline. However, it includes data from Cohorts 1 and 2. In addition, it examines juvenile (under age 18) criminal referrals as a mediator of cumulative criminal referrals into emerging adulthood. MS3 thus includes twice as many participants as MS1 or MS2 and includes 10 years of criminal referral data rather than 1 year (MS1) or 2 years (MS2).

The data reported in this manuscript were obtained from an existing dataset that examined the efficacy of Treatment Foster Care Oregon for females. A description of the original study, its evidence, and a bibliography of journal articles that examine the effects of Treatment Foster Care Oregon is available at <https://www.blueprintsprograms.org/programs/31999999/treatment-foster-care-oregon/>. The relationships examined in the present article have not been examined in any previous or current articles, or to the best of our knowledge in any papers that will be under review soon.

To promote transparency and reproducibility, we have made our study analysis code and results from the sensitivity analysis available in an online supplement.