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Exploring the Effects of Maltreatment and Child Welfare System Experiences on Juvenile
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By

Jaclyn Edna Chambers

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in

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Committee in charge:

Professor Jennifer Skeem, Chair
Professor Jill Duerr Berrick
Professor Maya Petersen

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Abstract

Exploring the Effects of Maltreatment and Child Welfare System Experiences on Juvenile Justice Involvement

by

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Doctor of Philosophy in Social Welfare

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Professor Jennifer Skeem, Chair

This dissertation examines the effect of maltreatment and child welfare experiences – separately and together – on juvenile justice recidivism. Youth who are involved in both the child welfare system and the juvenile justice system have become a population of concern for researchers, policymakers, and practitioners primarily due to the perceived compounding adverse outcomes of dual-system involvement. Yet, there is still much that remains to be understood about the relationship between child maltreatment, child welfare system involvement, and juvenile delinquency from a causal perspective. Specifically, while there has been a consistent link found between maltreatment and any justice system involvement, the question of how maltreatment and child welfare experiences impact *recidivism* among youth who are already justice-involved has not been well explored. The few studies that examine recidivism among crossover youth are limited by narrow sample selection and lack of rigorous causal methods. Additionally, maltreatment and child welfare system experiences are often conflated in the literature and not examined as two separate and distinct experiences. The unique impacts of maltreatment versus child welfare system involvement and the combined interaction of these two distinct experiences on risk for recidivism are largely unexamined.

This study addresses these gaps in the research by rigorously examining how maltreatment and child welfare experiences may impact risk for juvenile justice recidivism, utilizing advanced causal inference methods and controlling for significant potential confounders. Maltreatment and child welfare involvement are also examined as two unique variables to further our understanding of how the distinct experiences impact recidivism. Specific aims include testing 1) whether a history of maltreatment increases the risk of recidivism, 2) whether a history of child welfare system involvement increases the risk of recidivism, and 3) whether self-reported maltreatment moderates the effect of child welfare involvement on recidivism.

This study involves a retrospective review of administrative data from the Santa Clara County Probation Department (SCCPD). The study sample includes 287 youth who were referred to probation between August 2015 and December 2017, exited probation during that time, and had at least one sustained petition during that time. I chose to focus on youth with at least one sustained petition because the only measure of recidivism in the dataset is a subsequent sustained petition. Additionally, although imperfect, sustained petitions are the best available measure of

whether an offense actually occurred. Recidivism data was measured through June 2019, allowing for 18 months of follow-up data for all youth in the sample. Youth with two or more sustained petitions were considered to have recidivated. Analyses were conducted using targeted maximum likelihood estimation (TMLE) – a doubly-robust, semi-parametric approach that uses estimates of both the treatment mechanisms and the outcome regressions to rigorously control for associations between confounders and both treatment and outcomes, making it a particularly useful method for examining causal questions using quasi-experimental designs where comparison groups may not be equivalent at baseline.

While the extant literature has established a relationship between maltreatment and justice-system involvement, there are few studies that examine the outcome of recidivism. This study did not find a significant relationship between either maltreatment or child welfare system involvement and recidivism. Neither maltreatment nor child welfare system involvement impacted a youth's likelihood of recidivism at 18 months, and there were no moderation effects when examining the interaction between maltreatment and child welfare system involvement. It may be that this study found no relationship among these experiences due to the unique design of this study – including the broader sample used, important confounders included, and causal methods utilized; alternatively, the results may not align with previous literature due to limitations in this study's dataset, such as a relatively small sample size and some missingness in key variables.

How these two distinct experiences – maltreatment and child welfare involvement – may impact juvenile justice outcomes is a policy-relevant question in need of further examination. Future research should examine child welfare system involvement using advanced causal inference methods where the data allows for a more detailed and complete picture of the youth's involvement with the child welfare system, such as data on case openings, out-of-home-placements, and timing of system involvement. This type of research would help illuminate the specific child welfare experiences and pathways that may be helpful or harmful to a youth's risk of recidivism.

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Chapter 1: Introduction

This dissertation examines the effect of maltreatment and child welfare experiences – separately and together – on juvenile justice involvement. Youth who are involved in both the child welfare system and the juvenile justice system (i.e., crossover youth) have become a population of concern for researchers, policymakers, and practitioners primarily due to the perceived compounding adverse outcomes of dual-system involvement. While studies focused on crossover youth have grown in recent decades, there is still much that remains to be understood about the relationship between child maltreatment, child welfare involvement, and juvenile delinquency from a causal perspective.

Specifically, the literature has often examined the relationship between maltreatment/child welfare involvement and initial juvenile justice contact; however, the impact of child welfare experiences on recidivism among youth who are already justice-involved has not been well explored. Additionally, maltreatment and child welfare system experiences are often conflated in the literature and not examined as two separate and distinct experiences. My dissertation will help address these gaps in the research by examining both maltreatment and child welfare experiences that could potentially increase risk for future juvenile justice recidivism. I will apply causally informative methods to improve our knowledge on the mechanisms by which maltreatment and child welfare involvement may lead to juvenile justice recidivism, which can help inform policy and practice recommendations for improving youth outcomes.

I focus on recidivism because the link between maltreatment and any justice involvement is relatively well-established, yet only a few studies examine the question of recidivism after initial legal involvement. These studies generally find that youth with child welfare maltreatment histories have higher rates of recidivism than youth without such histories (Halemba et al., 2004; Lee & Villagrana, 2015; Ryan et al., 2013). However, there are a few primary issues with the existing literature in this area that limit our understanding of the causal relationship between maltreatment, child welfare experiences, and recidivism.

First, the methods utilized in these studies do not always isolate the causal relationship of interest. Some studies report only a descriptive difference between groups. For example, in their examination of court administrative data for 18,584 youth in Arizona, Halemba and colleagues (2004) report that youth with a history of dependency court proceedings (i.e., child welfare system history) were more likely than youth without this history to have recidivating referrals to court on delinquency matters (62% vs. 30%), but they did not attempt to isolate this relationship by controlling for any potential confounders. Among the studies that do include a non-crossover comparison group, none use advanced causal inference methods to rigorously examine the causal relationship between maltreatment/child welfare involvement and recidivism and key confounders, such as previous juvenile justice involvement, are not always included in the analyses.

Second, the extant literature does not illuminate the relationship between maltreatment, child welfare system experience, and recidivism among a broad population of youth involved with probation. The samples for studies in this domain typically consist of crossover youth with no non-crossover comparison. For example, in their study of 581 crossover youth in Los Angeles County, Herz and colleagues (2010) found that older age at arrest, gang involvement, substance abuse, and truancy were significant predictors of recidivism for crossover youth. Similarly, Huang et al. (2015) studied violent offenders with open child welfare cases and found that

moving crossover youth from a family-like setting to a congregate care setting was associated with significantly higher rates of recidivism. While informative about potential risk factors for recidivism among crossover youth, these studies do not compare youth with a history of maltreatment to those without such a history nor account for congregate care selection effects. Among those studies that do include a non-crossover comparison group, they focus on deep end juvenile justice youth such as youth with high risk scores (Ryan et al., 2013) or youth completing juvenile justice residential programs (Baglivio et al., 2016), thus their implications for a broader population of justice-involved youth are limited.

Similarly, the literature on recidivism defines the outcome variable in different ways, including subsequent rearrest (Lee & Villagrana, 2015; Ryan et al., 2013) and subsequent charges filed (Huang et al., 2012). Previous studies have not examined the impact of maltreatment/child welfare involvement on recidivism using sustained petitions as the measure of recidivism. This recidivism measure is important to examine because it indicates that the court has found that a youth has in fact committed a recidivating offense, as opposed to recidivism measures such as re-arrest which only indicate further contact with the justice system.

Finally, existing studies tend to conflate childhood maltreatment and involvement with the child welfare system, when these are two distinct experiences that may have different impacts on recidivism. The only known recidivism study that has examined these as two distinct phenomena gives some indication that further exploration of the complex dynamics among these experiences is warranted. Baglivio and colleagues (2016) examined 12,955 youth completing juvenile justice residential programs. Using structural equation modeling (SEM), they found that adverse childhood experiences did not have a direct effect on recidivism, but there was a significant indirect pathway whereby adverse childhood experiences exhibit an effect on recidivism indirectly through child welfare involvement, as well as a significant direct pathway from receiving child welfare services (in-home or out-of-home) to recidivism. This indicates that there is more to unpack regarding the impact of maltreatment compared to child welfare involvement on recidivism.

This study will address these gaps in the research by rigorously examining how maltreatment and child welfare experiences may impact risk for juvenile justice recidivism – utilizing advanced causal inference methods, controlling for significant potential confounders, examining a broad range of probation-involved youth, and using sustained petitions as the outcome of interest. Additionally, I will attempt to examine the impact of maltreatment and child welfare involvement as two distinct experiences. This study will use administrative data from the Santa Clara County Probation Department (SCCPD) to test 1) whether a history of maltreatment increases the risk of recidivism, 2) whether a history of child welfare system involvement increases the risk of recidivism, and 3) whether the combined experience of child welfare system involvement and maltreatment interact to create a greater risk for recidivism among youth who have experienced both. The study sample will include 287 youth who were referred to probation between August 2015 and December 2017, exited probation during that time, and had at least one sustained petition during that time. Recidivism data was measured through June 2019, allowing for 18 months of follow-up data for all youth in the sample. Youth with two or more sustained petitions were considered to have recidivated. Analyses will be conducted using targeted maximum likelihood estimation (TMLE) – a doubly-robust, semi-parametric estimation approach that uses estimates of both the treatment mechanisms and the outcome regressions to rigorously controls for confounders.

Chapter 2: Review of the Literature

This dissertation focuses on examining how maltreatment and child welfare experiences – separately and together – impact risk for juvenile justice recidivism. In this literature review, I will begin with a very brief review of crossover youth to set the stage, including a description of the primary crossover pathways and their prevalence. I will then explore the theoretical underpinnings of the relationship between maltreatment, child welfare involvement, and juvenile justice involvement. Since the literature on recidivism among crossover youth is scant compared to the literature on initial juvenile justice involvement, I will summarize the literature on the relationship between child welfare involvement/maltreatment and initial juvenile justice involvement, highlighting the risk factors that have been identified in the extant literature. I will particularly explore the risk factors for delinquency that are related to child welfare system involvement. Next, I will turn my focus to the few studies in this area that specifically focus on the outcome of juvenile justice recidivism, and I will describe the limitations and gaps in our current knowledge on the relationship between child welfare involvement/maltreatment and recidivism. Finally, I will describe how the current literature often conflates child welfare involvement and maltreatment and highlight the need to tease apart these two distinct experiences.

Prevalence of combined child welfare and juvenile justice involvement

Crossover youth refers to youth who have experienced both maltreatment and delinquency. This maltreatment and delinquency may or may not have come to the attention of official systems of care, although the majority of the literature focuses on youth who have had some experience in the child welfare system and/or juvenile justice system regardless of the timing or depth of this involvement. Two recent studies have laid out a helpful definition of various crossover pathways and have attempted to understand the prevalence of each pathway (Herz et al., 2019, 2021). The pathways identified include: *dual contact* youth who have had experience in both systems but have non-concurrent contact, *dual system* youth who touch both the child welfare and juvenile justice systems and the contact is concurrent, and *dually-adjudicated youth* who are concurrently in the care of child welfare and under the formal supervision of the juvenile justice system. These studies examined the prevalence of each of these pathways using linked administrative data from four separate geographic jurisdictions and found that prevalence of dual system contact of any type ranged from 44.5% to 70.3%, depending on the jurisdiction. Among those with dual system contact, 49.2% to 76.2% were dual contact (non-concurrent) youth, and 27.4% to 46.5% were dual system (concurrent) youth. The studies found very low numbers of dually-adjudicated youth (exact percentages were not reported).

Crossover youth outcomes. Research has found that the experience of dual child welfare and juvenile justice involvement is associated with negative outcomes. Youth with complex needs are more likely to be involved in both systems, and lack of service coordination between systems can lead to poorer outcomes (Haight et al., 2016). Crossover youth experience worse outcomes in domains such as health and educational attainment (Hirsch et al., 2018; Jonson-Reid et al., 2017). While child welfare outcomes have been less frequently examined, one study found that crossover youth who have a longer child welfare case duration have poorer permanency outcomes (i.e., nonpermanent outcomes at case closure, such as emancipation or runaway)

compared to crossover youth with shorter child welfare case durations (Orsi et al., 2018), although it is unclear how much of a causal impact case duration has on these outcomes as youth with longer case durations suggest more complex child and family needs that may be contributing to negative outcomes. Nonetheless, these poor outcomes speak to the importance of identifying causal factors that can be changed to improve wellbeing and the need to examine other potential negative outcomes, such as recidivism.

Theorizing the relationship between maltreatment, child welfare involvement, and delinquency

Arguably the most prominent theoretical orientation used to explain the relationship between maltreatment and delinquency is a developmental one. According to a developmental perspective, maltreatment is a risk factor for future delinquency because maltreatment negatively affects attachment, trust, feelings of safety, and other protective relational factors that are important during a youth's social-emotional development (Young & Widom, 2014). This disruption in a youth's social-emotional development can lead to impulsive or aggressive behaviors, which lead the youth to come to the attention of the juvenile justice system (Teisl & Cicchetti, 2008). Developmental criminology and life-course theory highlight how the timing of risk factors can be crucial in determining how much they impact later outcomes (Elder, 1998; Farrington, 2003; Loeber & Stouthamer-Loeber, 1996). Providing empirical evidence for this theoretical framework for crossover youth, Thornberry et al. (2001) found that the age of maltreatment is related to delinquency outcomes, with maltreated adolescents experiencing more justice system involvement. They found that participants who experienced any adolescent maltreatment had more than two times the odds for general offending ($OR=2.06$, $p<0.05$) and for experiencing an official arrest/incarceration ($OR=2.10$, $p<0.01$) compared to matched participants who were never maltreated. There were no significant relationships for these outcome variables when comparing youth with childhood-limited maltreatment and non-maltreated youth. Additionally, neurocognitive development research shows that childhood and adolescence are sensitive periods for developing the areas of the brain related to decision-making and impulse control (Arain et al., 2013; Casey et al., 2008; Hodel et al., 2015) and that chronic stress impacts decision-making (Dias-Ferreira et al., 2009; Friedman et al., 2017), suggesting that the stressful experience of maltreatment could impact future behaviors such as delinquency. Maltreatment could similarly impact delinquency recidivism, as recidivism is essentially ongoing illegal behavior. If maltreatment has negatively impacted a youth's social-emotional development or decision-making abilities, it is likely that these impacts are far-reaching and would not simply end at the first interaction with the justice system. Maltreatment has also been shown to be predictive of other known risk factors for recidivism, such as engagement with antisocial peers (Herrenkohl et al., 2003). Additionally, there is some empirical evidence that maltreatment does in fact predict juvenile justice recidivism (Li et al., 2015; Mulder et al., 2010).

Similarly, the experience of child welfare system involvement can cause stress and emotional disruption during a sensitive developmental period. This is particularly true for youth who experience extensive and disruptive child welfare system experiences, such as placement out of home or multiple placements in care. For instance, extended time in foster care has been linked to multiple negative outcomes including problems with cognitive functioning/academic achievement (Courtney & Dworsky, 2006), poor physical health (Halfon et al., 1995; Hansen et al., 2004; Schneiderman et al., 2007), behavioral and emotional problems (Walsh & Mattingly, 2011), and social functioning problems (Pecora et al., 2006), among others. However, other

literature highlights that potentially any child welfare involvement – even just an investigation – could be disruptive to a youth and their family. For instance, in their qualitative study, Thrana and Fauske (2014) found that being assessed by child welfare workers caused significant stress among parents; while this study did not speak to the experiences of children, it is reasonable that the experience of a child welfare investigation could create a similar stress response in youth. Studies have also found post-traumatic stress symptoms in youth who were referred for child welfare investigation (Kolko et al., 2010), however it is unclear if these symptoms are more directly tied to the experience of maltreatment or the child welfare system experiences themselves. Thus, like the experience of maltreatment itself, involvement with the child welfare system could cause stress that impacts decision-making. This stress is likely more pronounced among youth with more extensive involvement with the child welfare system, such as those who are placed out of home; however, because youth placed in out-of-home care are also more likely to have experienced more severe maltreatment, it is important to disentangle the effects of maltreatment and child welfare involvement.

Both maltreatment and child welfare involvement could cause stress, impact attachment, and disrupt a youth's social-emotional development during a key period of their life. Therefore, it is critical to better understand the impact of having *both* experiences. There is a theoretical and empirical basis for the notion that multiple adverse experiences can interact to create the greatest risk for poor outcomes among those who experience multiple adverse events. Multiple adverse experiences can trigger a “toxic stress” response and experiencing a large number of adverse events has been linked to mental and physical problems much later in life (Hertzman, 2013; Nelson et al., 2020; Shonkoff et al., 2012). Thus, youth who experience both maltreatment and child welfare involvement may be at particular risk for negative outcomes, such as ongoing juvenile justice involvement.

Risk factors for justice involvement

A significant portion of the literature on crossover youth has focused on identifying risk factors that increase the likelihood of future juvenile justice involvement among youth with child welfare system experience. While this literature review and dissertation focuses primarily on the relationship between maltreatment/child welfare involvement and juvenile justice involvement, it is important to note that maltreatment has also been found to be associated with involvement with the adult criminal justice system (Barth et al., 2010; Barth & Jonson-Reid, 2000; Berzin, 2008).

Child welfare case processing variable factors. A key focus in the crossover youth literature is identifying child welfare system experiences that may lead to future delinquency. Past research has found that there are a number of child welfare case processing risk factors. Taken together, this literature highlights that the dynamics of child welfare system experiences are directly related to risk of future juvenile justice involvement.

Out-of-home versus in-home intervention. One major question in the literature is whether being placed out-of-home by the child welfare system (foster care, group home, kinship placement, etc.) increases a youth's risk for delinquency. Early studies of crossover youth found that there was no relationship between out-of-home placement and future juvenile justice involvement (Runyan & Gould, 1985; Widom, 1991). However, there were several methodological and sample selection issues among these early studies that required further

investigation to understand this relationship. More recent and more rigorous studies have indicated that out-of-home placement is likely a risk factor for crossover between child welfare and juvenile justice. Using a large sample of 36,653 children ages 5 through 16 years reported for maltreatment in Missouri, Jonson-Reid (2002) found that children placed out-of-home were over three times more likely to experience future juvenile incarceration (risk ratio=3.35, $p<0.001$) than youth reported for maltreatment but not placed out of home, controlling for covariates including age, gender, race, and severity of maltreatment. In a sample of 18,676 children with substantiated child welfare reports, Ryan and Testa (2005) found that male youth who were placed out of home are 89% more likely to have a delinquency petition than male youth with a substantiated child welfare report who were not placed out of home (OR=1.89, $p<0.001$), and female youth placed out of home are 2.11 more likely to experience delinquency than female youth with a substantiated child welfare report who were not placed out of home (OR=2.11, $p<0.001$), controlling for age, race, type of maltreatment, and number of substantiated reports. Goodkind et al. (2013) also report a relationship between child welfare placement and later juvenile justice placement, although to a lesser degree; they found that youth with an out-of-home placement had a 36% increased likelihood of juvenile justice involvement compared to youth who received in-home child welfare services but were not placed out of home (OR=1.36, $p<0.001$). These studies suggest that one aspect of child welfare involvement – being placed out of home – may contribute to risk for delinquency, although more rigorous studies are needed that control for key confounders such as youth's mental, emotional, and behavioral needs.

Type of out-of-home placement. Type of out-of-home placement also appears to be related to crossover risk, with group home placements associated with higher risk and kinship placements associated with lower risk. However, studies that isolate the relationship between type of placement and later juvenile justice outcomes are greatly needed. It is likely that youth placed in group home settings differ significantly from youth placed in foster care or kinship settings in ways that are related to delinquency risk, and most studies examining the impact of group home placements do not control for key confounders related to youth behavioral needs. For example, Cutuli et al. (2016) found that congregate/group home placements were associated with a higher risk for juvenile justice involvement in a sample of 49,352 child-welfare involved youth from three cities; statistically significant hazard ratios ranged from 2.36 to 4.96 depending on geographic location and youth age at time of placement. Baskin & Sommers (2010) found similar results suggesting that group home placements are a risk factor. Yet, neither Cutuli et al. (2016) nor Baskin and Sommers (2010) controlled for any variables related to youth mental, emotional, or behavioral needs. Using a stronger propensity score matching design for a sample of 8,226 youth drawn from administrative records, Ryan et al. (2008) found youth with at least one group home placement had about two and half times the risk for future delinquency arrest compared to youth in foster care placements (risk ratio=2.40, $p<0.01$). Because youth who are placed in group care are more likely to be placed there because they have a higher level of need and more challenging behaviors, this study used two variables related to youth behavioral problems in the propensity score matching (among the other variables used). Youth were matched based on placement changes related to AWOL and placement changes related to child behavioral problems. While these two variables do not completely account for youth characteristics that may be confounding the relationship between group home placement and delinquency, this study provides some support that group home placements may be linked to crossover risk. On the other hand, most studies have found that kinship placements are protective

against future conduct problems (Cutuli et al., 2016; Holtan et al., 2005; Rubin et al., 2008; Tarren-Sweeney & Hazell, 2006), although one study found that kinship placements are a risk factor for future juvenile justice involvement for Black and White male adolescents but a protective factor for Latinx adolescents (Ryan et al., 2010). Although again, additional studies are needed to control for selection bias and isolate the relationship between kinship care and future juvenile justice outcomes, as youth with fewer behavioral needs may be more likely to receive kinship care.

Placement moves. Placement moves are measured by the number of times a youth officially moved physical locations while in out-of-home care (e.g., a youth who began in congregate care then moved to a foster home then moved to a kinship placement would have two placement moves). This is often referred to in the literature as placement instability. Early literature found that as the number of placement moves increases, so does the risk for future juvenile arrest, juvenile delinquency convictions, and adult arrest (Runyan & Gould, 1985; Widom, 1991). Yet scholars critiquing early literature in this area noted that drawing causal inferences from these studies is impossible because temporal order was not established; in other words, the design of the studies did not allow the researchers to disentangle whether placement instability is a cause or consequence of delinquency (Jonson-Reid, 2002; Ryan & Testa, 2005). Attempting to rectify this problem and get closer to causally informative studies, Ryan and Testa (2005) examined two birth cohorts of 18,676 children with substantiated child welfare reports and followed them through age 18, taking into account timing of placement moves and delinquency. They found that placement instability was a risk factor for male youth but not female youth. Male youth with three placement moves were 53% more likely to have a delinquency petition ($OR=1.53$, $p<0.05$). Similarly, Baskin and Sommers (2010) examined a sample of 1,235 youth receiving child welfare services in Los Angeles and found that youth with at least one placement change were more than two times as likely to be arrested (risk ratio=2.27; $p<0.001$). Goodkind et al. (2013) examined this question – controlling for the key confounder of youth behavioral problems by including covariates for runaway, mental health services, and substance abuse services – and found that each additional placement move was associated with an 11% increase in the likelihood of future juvenile justice placement.

Length of stay in out-of-home placements. While some risk factors related to out-of-home placements – such as number of placement moves or type of placement – have had relatively consistent findings, studies that have examined length of stay in out-of-home placements have had mixed results. Some studies have found that longer stays in out-of-home placements are protective against delinquency and others have found that longer stays are a risk factor for delinquency. Early bivariate analyses found that those who spent 10 or more years in their first placement had the lowest rate of arrest, suggesting that a longer placement is actually protective against future delinquency (Widom, 1991). In a more recent study, Goodkind et al. (2013) examined a sample of 3,712 individuals born between 1985 and 1994 who were placed in out-of-home care for any length of time in Allegheny County, Pennsylvania. The authors found that for each additional year in placement, the odds of juvenile justice placement decreased by 7% when controlling for the other covariates in the model ($OR=0.93$, $p<0.001$).

In contrast to the findings in the Widom (1991) and Goodkind et al. (2013) studies, Jonson-Reid and Barth (2000b) found that length of placement increases risk for juvenile justice involvement. Using a sample of 79,139 youth in California with at least one out-of-home

placement spell, Jonson-Reid and Barth (2000b) used a Cox proportional hazards model to examine the relationship between placement length and juvenile incarceration. They controlled for age at first placement, race, gender, maltreatment report type (neglect, physical abuse, sexual abuse), whether a youth was reunified after their first placement spell, and whether a youth's placement was changed to probation supervised foster care. They found that youth whose first spell in an out-of-home placement was longer than 18 months were more likely to be incarcerated prior to age 18 compared to youth whose first spell in out-of-home care was less than 18 months (hazard ratio = 1.96, $p < 0.001$). Baskin and Sommers (2011) also found that longer placement length was related to increased risk for delinquency. They examined 2,429 youth using Cox regression analyses and found that each additional year of placement increased the odds of arrest by 23% ($OR = 1.23$, $p < 0.001$). Thus, given these mixed results, the causal relationship between length of stay in out-of-home placements and juvenile justice involvement is unclear.

Dimensions of maltreatment. Childhood maltreatment has been linked to future delinquency (Mersky & Reynolds, 2007; Smith & Thornberry, 1995), and there are a number of dynamics related to the type and severity of maltreatment that have been identified as risk factors that increase the likelihood of future juvenile justice involvement for youth who have been in the child welfare system.

Type of maltreatment. Type of abuse or neglect has been identified as an important factor related to juvenile justice involvement, although findings in this area have been mixed. Some research has shown that verbal abuse (Salzinger et al., 2007), physical abuse (Taussig, 2002), and supervisory neglect increase risk (Verrecchia et al., 2010), whereas other studies have found that only sexual abuse increases risk (Yampolskaya, Armstrong, & McNeish, 2011). The differences between studies appear to stem from how researchers defined their comparison groups. For example, Verrecchia et al. (2010) compared youth with supervisory neglect to a combined group of youth with all other types of maltreatment (physical abuse, sexual abuse, abandonment, educational neglect, etc.) in a sample of 632 youth and found that supervisory neglect was associated with delinquency referrals ($r = 0.34$, $p < 0.001$). In contrast, a study of 13,212 youth in Florida who were placed in out-of-home care found that youth who experienced sexual abuse had 36% higher odds of being placed in a detention center than youth whose type of maltreatment was threatened harm ($OR = 1.36$, $p < 0.05$; Yampolskaya, Armstrong, & McNeish, 2011). This model controlled for gender, age, race, caregiver absence, chronicity of maltreatment, severity of maltreatment, prior juvenile justice involvement, and time of removal. No significant differences were found for youth who were physically abused or neglected compared to youth with threatened harm.

Maltreatment recurrence/chronicity. Recurrence of maltreatment has been linked to juvenile justice involvement and antisocial behaviors in youth. In a sample of 18,676 youth with at least one substantiated report of maltreatment, Ryan and Testa (2005) found that a higher number of separate substantiated incidents of maltreatment was associated with an increased risk for a future juvenile justice petition. Among males in the sample, those with two substantiated reports had 49% greater odds of delinquency than those with only one substantiated report ($OR = 1.49$, $p < 0.001$), and males with three substantiated reports had 78% greater odds ($OR = 1.78$, $p < 0.001$). Similarly, females with three substantiated reports have a 94% greater likelihood of a

future delinquency petition than females with only one substantiated report (OR=1.94, $p<0.001$). In the Yampolskaya, Armstrong, and McNeish (2011) study described above, the authors found that each additional maltreatment report was associated with a 10% increased risk for placement in a detention center.

Maltreatment severity. While studies have defined maltreatment severity using different rating scales, there are indications that the intensity of maltreatment can be related to delinquency. Using a scale of injury severity ranging from 0 to 5.5, Verrecchia et al. (2010) found that maltreatment severity was somewhat associated with a delinquency referral among a sample of 632 low-income youth ($r=0.22$, $p<0.001$); however this is a zero-order correlation that did not control for any other variables. In two other studies that used different rating scales for maltreatment severity, severity was found to be associated with youth conduct problems (Litrownik et al., 2005; Manly et al., 1994).

Demographic risk factors. In addition to child welfare system factors, there are individual demographic factors that have been found to increase the risk of juvenile justice involvement for child welfare involved youth. Demographic factors that are associated with an increased likelihood of dual-involvement in the child welfare and juvenile justice system include race, with Black youth at higher risk compared with White youth, and gender, with child-welfare involved males being at higher risk than child-welfare involved females (Cho et al., 2019; Goodkind et al., 2013; Jonson-Reid & Barth, 2000a, 2000b).¹ Additionally, the intersection of race and gender puts Black males at highest risk.

Race and gender. Black, male adolescents – with or without child welfare experience – are significantly overrepresented in the juvenile justice system. National data from the Office of Juvenile Justice and Delinquency Prevention indicate that Black youth are referred to juvenile court for a delinquency offense at about 3 times the rate of White youth (Puzzanchera & Hockenberry, 2018). Additionally, Black youth are also overrepresented in the child welfare system. A review of the child welfare literature found that Black families are more likely than White families to: 1) be screened in for investigation, 2) have substantiated allegations, and 3) have a child removed from the home (Hill, 2006). Black children have 2.26 times greater relative risk of foster care placement compared to White children ($p<.001$; Wildeman & Emanuel, 2014). Scholars have consistently found similar disparities for crossover youth. Goodkind et al. (2013) found that within a sample of child welfare involved youth receiving either in-home services or out-of-home placement, the rate of juvenile justice involvement was about twice as high for Black males as it was for everyone else (22% for Black males compared to 10% for White males, Black females, and White females); about 49% of youth in this sample had their child welfare case closed before the age of 13 and 51% had a child welfare case that continued past the age of 13. Similarly, Jonson-Reid and Barth (2000b) found that Black, male foster youth had the highest rate of entry into a juvenile detention facility following foster care. These studies compared crossover youth to youth with child welfare experience who did not have juvenile justice involvement. When comparing crossover youth to the general population, females with child welfare experience may actually be at higher risk, with one study finding that females with child welfare experience entered into juvenile detention at a rate ten times higher than females in

¹ These variables are typically treated as fixed in the literature, although both gender and race could be considered variable (see Fausto-Sterling, 2012a, 2012b; Smedley & Smedley, 2005).

the general population, whereas males entered into detention at a rate five times higher than males in the general population (Jonson-Reid & Barth, 2000).

Youth age. The age at which a youth experiences child welfare involvement is associated with future juvenile justice involvement. While youth may experience child welfare involvement at multiple time points, studies have consistently found that youth who experience any maltreatment during adolescence are at higher risk than youth who experience childhood-limited maltreatment (Cutuli et al., 2016; Goodkind et al., 2013; Jonson-Reid & Barth, 2000a, 2000b; Ryan & Testa, 2005; Stewart et al., 2008). Using logistic regression to examine age as a risk factor among 17,471 youth who received child welfare services in Allegheny County, Pennsylvania, Goodkind et al. (2013) found that youth whose child welfare cases were open after the age of 13 are more than three times as likely to experience later juvenile justice involvement than youth whose cases closed before age 13 (OR=3.27, $p<0.001$). Covariates in this model included, race, gender, ever experiencing an out-of-home placement, and receiving mental health or substance abuse services, but the authors did not control for other potentially key confounders such as severity and chronicity of maltreatment.

In the methodologically strongest study examining this risk factor, Thornberry et al. (2010) used propensity-score matching to test whether maltreatment impacted future negative outcomes and whether this varied by youth age at the time of maltreatment. They found that participants who experienced any adolescent maltreatment had more than two times the odds for general offending (OR=2.06, $p<0.05$) and for experiencing an official arrest/incarceration (OR=2.10, $p<0.01$) compared to matched participants who were never maltreated. There were no significant relationships for any of these outcome variables when comparing youth with childhood-limited maltreatment and non-maltreated youth.

Gaps in current knowledge

Below I identify gaps in the current crossover youth literature that this dissertation will address.

Risk of juvenile justice recidivism

While the overall relationship between maltreatment/child welfare involvement and initial juvenile justice involvement has been a significant focus in the literature, the impact of maltreatment and child welfare involvement on juvenile justice recidivism has received less attention. The few studies that have examined this outcome have generally found that youth who have been involved in both the child welfare and juvenile justice systems have higher juvenile delinquency recidivism rates than non-crossover youth (Herz et al., 2010; Ryan et al., 2013). However, the extant literature is limited by narrow a lack of rigorous causal methods and narrow sample selection, as described below.

In many of the crossover youth recidivism studies, causal interpretations are limited by the lack of a comparison group. The samples for studies in this domain often consist of crossover youth with no non-crossover comparison. For example, in their study of 581 crossover youth in Los Angeles County, Herz and colleagues (2010) found that older age at arrest, gang involvement, substance abuse, and truancy were significant predictors of recidivism for crossover youth. Similarly, Huang et al. (2015) studied violent offenders with open child welfare cases and found that moving crossover youth from a family-like setting to a congregate care setting was associated with significantly higher rates of recidivism. While informative about

potential risk factors for recidivism among crossover youth, these studies do not compare youth with a history of maltreatment to those without such a history, and additionally do not sufficiently account for potential selection biases for those who go into group care.

There are a few studies that have included a non-crossover comparison group when examining recidivism, but several of these report only descriptive differences between groups. In their examination of court administrative data for 18,584 youth referred to the court for a delinquency matter, Halemba and colleagues (2004) report that youth with a history of dependency court proceedings were more likely than youth without a dependency history (i.e., non-crossover youth without a court history of child welfare involvement) to have recidivating delinquency referrals (62% vs. 30%). However, this study was a descriptive report of group differences only; they compared rates of recidivism among justice-involved youth with and without a child welfare history, but did not attempt to isolate the causal relationship between maltreatment and recidivism by controlling for any potential confounders. Huang et al. (2012) examined a sample of 1,148 dually-involved youth in Los Angeles, and overall found high rates of recidivism among crossover youth. Approximately 56% of the sample of crossover youth were charged with a recidivating offense; the authors state that the rate of recidivism among comparable delinquency only youth was 41%. (Similar to the Halemba et al. (2014) study, this group difference was not tested empirically, just provided descriptively.) Results of a Cox regression indicated that placement in a juvenile justice facility was significantly associated with recidivism, after controlling for gender, age, race, child welfare experience indicators (e.g., out of home placement), and most serious charge for index arrest.

Lee and Villagrana (2015) examined risk and protective factors related to recidivism for crossover youth in the domains of delinquency, education, family, peer, substance use, and individual. They examined a sample of 1,489 crossover youth – defined as juvenile justice-involved youth with a history of child welfare system involvement – and 1,254 comparison youth who were involved in the juvenile justice system but did not have a history of child welfare system involvement. Recidivism was measured as re-arrest after initial probation referral. Among the crossover youth sample, 72% were re-arrested compared to 61% of delinquency-only youth. Crossover youth had significantly lower protective factors and higher risk factors in all domains than the non-crossover group, and the domains for substance use, education, and peers were found to be significantly related to risk of recidivism for crossover youth.

Ryan et al. (2013) conducted one of the most rigorous studies that used child welfare records to examine the effect of maltreatment on recidivism. Using administrative records for 19,833 youth referred to probation in Washington state Ryan et al. (2013) looked at the impact of neglect, specifically, on juvenile justice recidivism. Recidivism was defined as subsequent rearrest after initial referral to probation. The authors looked at justice-involved youth with no neglect, past neglect, and ongoing neglect. They conducted a Cox regression that controlled for a range of youth, family, school, and peer covariates, and they found that adolescents with ongoing neglect were 17% more likely to recidivate than youth with no neglect.

In addition to Ryan et al.'s (2013) study, there are a few additional studies that suggest type of maltreatment could impact risk for recidivism, although results of these studies are mixed. A study of 13,613 youth with a juvenile court conviction found that both neglect and physical abuse were significantly, though weakly, associated with recidivism for both male and female youth (van der Put & Ruiter, 2016). However, Kingree et al. (2003) found that self-

reported emotional neglect specifically predicted 6-month recidivism among adolescent detainees, whereas other types of abuse and neglect did not.

While these studies have begun to shed light on the complex relationship between maltreatment and recidivism, there are significant gaps still existing in the literature. First, as mentioned above, many studies do not include a non-crossover comparison group. Second, even among the studies that do include a non-crossover comparison group, the crossover youth sample definitions are quite narrow. The literature on crossover youth recidivism has generally focused on a narrow, deep-end definition of justice-involved youth such as youth with moderate to high risk scores (Ryan et al., 2013) or youth completing juvenile justice residential programs (Baglivio et al., 2016), thus their implications for a broader population of justice-involved youth are limited. Third, many studies do not control for key confounders like delinquency history or risk level, limiting a causal interpretation of the results. Fourth, the definition of recidivism in these studies varies, with some studies examining rearrest and others examining petitioned offenses. Finally, none of these studies use advanced causal inference methods, such as TMLE.

Conceptualizing maltreatment versus child welfare involvement

Another complexity in the crossover youth literature is related to the operational definitions of maltreatment and child welfare involvement. In operationalizing the concept of maltreatment, many studies assume that child welfare involvement means that maltreatment has occurred. For example, Thornberry et al. (2001) operationalize maltreatment as a child protective services (CPS) record of substantiated allegations; Ryan and Testa (2005) use the number of separate substantiated incidents of maltreatment to measure maltreatment chronicity; and Yampolskaya et al. (2011) define maltreatment chronicity as the number of maltreatment reports (substantiated or not). These studies assume that a CPS record and maltreatment are one in the same. However, by using child welfare system indicators to measure maltreatment, the authors do not address the possibility that child welfare system involvement *in and of itself* could be impacting future outcomes. Additionally, it is possible that there are youth who experience maltreatment who do not come to the attention of the child welfare system, and similarly that there are youth who come to the attention of the child welfare system who were not necessarily maltreated. By conflating the concept of maltreatment and child welfare involvement, the literature has not allowed for an examination of how maltreatment and child welfare involvement may each differentially impact the risk of juvenile justice involvement and subsequent recidivism.

The distinction between these two experiences is difficult to study due to lack of representative samples with both self-report maltreatment data and official child welfare data. The literature we do have on whether child welfare substantiations truly indicate maltreatment is mixed. Drake's (1996) seminal article suggests that youth with an unsubstantiated child maltreatment report do not differ drastically from youth who have substantiated maltreatment reports, and he suggests that "many or most unsubstantiated reports involve either some form of maltreatment or preventive service needs appropriate to CPS intervention" (p. 261). However, a more recent study suggests that there is more complexity. Danese and Widom (2020) examined a sample of 1,196 participants comprised of people with an official record of substantiated maltreatment and a comparison group with no official maltreatment record. The comparison group was matched on age, race, gender, and socioeconomic status. Participants completed an in-person interview which asked about their experiences with childhood abuse and neglect. In their sample, the authors found that there was a fair amount of overlap between official records and

self-reported maltreatment. However, a substantial portion of participants self-reported maltreatment but never had an official record of maltreatment, and vice versa, a substantial portion of participants had an official record of maltreatment but did not self-report being maltreated. Overall, 41.7% of the sample had both an official record of maltreatment and self-reported maltreatment, 21.4% had self-reported maltreatment but no child welfare record, 14.7% had an official child welfare record but no self-reported maltreatment, and 22.2% had neither. The overlap between groups also varied depending on type of maltreatment. The proportion of participants self-reporting maltreatment with no child welfare record was highest for physical abuse (44.3%), and the proportion of participants with an official record of maltreatment but no self-reported maltreatment was highest for neglect (22.5%). This study has some limitations as it relies on child welfare court data from several decades ago and the self-report interview occurred at mean age 28.7, so participants' recall may not be precise. Yet, these data indicate that it is not necessarily accurate to assume that a CPS record and maltreatment are one in the same.

Teasing apart the distinction between maltreatment and child welfare involvement is important because there are indications that at least part of the risk of recidivism for crossover youth can be attributed to child welfare system involvement rather than maltreatment itself. Baglivio and colleagues (2016) conducted a path analysis of approximately 13,000 youth completing juvenile justice residential programs. They were interested in the direct effects of childhood adverse events on delinquency, as well as their indirect effects through child welfare involvement. Child maltreatment was operationalized as adverse childhood experience (ACE) scores and child welfare involvement was defined as a CPS record of receiving in- or out-of-home services. They found that adverse childhood experiences did not have a direct effect on recidivism, but there was a significant indirect pathway whereby adverse childhood experiences exhibit an effect on recidivism indirectly through child welfare involvement, as well as a significant direct pathway from receiving child welfare services (in-home or out-of-home) to recidivism. One limitation in this study is that ACE score is not an exact measure of maltreatment. While there are several versions of the ACE assessment, Baglivio et al. (2016) report that the ACE assessment used in their study measures several experiences including emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, domestic violence, household substance abuse, household mental illness, parental separation/divorce, and imprisonment history of a household member. The study does not differentiate between these experiences, and instead uses a cumulative ACE score. Nevertheless, the ACE scores do include multiple questions related to childhood maltreatment, and thus the results of this study indicates that there may be more to unpack regarding the impact of maltreatment compared to child welfare involvement on recidivism.

Present study

Thus while we have some knowledge on the relationship between maltreatment, child welfare involvement, and juvenile justice recidivism, there are still some significant gaps in understanding the causal relationship between these experiences. First, no study has applied state-of-the-art causally informative methods, such as doubly-robust estimators,² to examine the

² As described by Bang and Robins (2005): “an estimator is doubly robust if it remains consistent when either a model for the treatment assignment mechanism or a model for the distribution of the counterfactual data is correctly specified. Because with observational data one can never be sure that a model for the treatment assignment mechanism or a model for the counterfactual data is correct, inference based on doubly robust estimators should improve upon previous approaches” (p. 962).

relationship between maltreatment/child welfare involvement and recidivism. Second, many studies on recidivism are missing key confounders such as previous juvenile justice history. Third, studies vary on how they measure recidivism, and no study has operationalized recidivism as a subsequent sustained petition. Fourth, more research is needed on a broader population of crossover youth, rather than only deep end juvenile justice samples. Finally, only one study has conducted analyses that carefully consider the distinct experiences of maltreatment and child welfare involvement, which is crucial to better understand the risk factors for recidivism.

My dissertation will address these specific gaps. I will examine whether maltreatment and child welfare system involvement – separately and together – impact the risk of recidivism for justice-involved youth. Using a broad sample of youth who have been involved with probation, I will utilize the advanced causal inference method of targeted maximum likelihood estimation (TMLE) and control for key confounders. Recidivism will be measured as a subsequent sustained petition – a measure which indicates that a court determined that a youth did in fact engage in ongoing delinquency. I will examine the impact of self-reported maltreatment separately from child welfare involvement indicators, and I will also conduct moderation analyses that examine the combined impact of maltreatment and child welfare involvement.

Chapter 3: Study Design/Methods

This study will test whether maltreatment and child welfare system involvement – separately and together – impact the risk of recidivism for justice-involved youth.

Aims

Aim 1: To test whether a history of self-reported maltreatment increases the risk of recidivism for youth with juvenile justice involvement.

Hypothesis 1: Self-reported maltreatment will increase the risk of recidivism for youth with juvenile justice involvement.

Aim 2: To test whether a history of child welfare system involvement increases the risk of recidivism for youth with juvenile justice involvement.

Hypothesis 2: Child welfare system involvement will increase the risk of recidivism for youth with juvenile justice involvement.

Aim 3: To test whether self-reported maltreatment moderates the effect of child welfare involvement on recidivism.

Hypothesis 3: Child welfare system involvement and self-reported maltreatment will interact, and youth with both system involvement and self-reported maltreatment will have the greatest risk for recidivism.

Design

This study will involve a retrospective review of administrative data from Santa Clara County Probation Department (SCCPD). Recidivism for youth with maltreatment histories will be compared to youth without maltreatment histories, and recidivism for youth with histories of child welfare system involvement will be compared to youth without histories of child welfare system involvement.

Human Subjects Procedures

This study was approved in January 2020 by the Institutional Review Board at the University of California, Berkeley (protocol ID 2019-12-12782).

Study Sample

This study utilizes an administrative dataset from the Santa Clara County Probation Department (SCCPD) that was originally compiled for a previous study on recidivism. The original dataset was comprised of all youth who exited probation between 2013 and 2017 (N = 7,176). My study will only include youth who were referred to probation after August 2015 (N = 2,525), as this is when probation began collecting child welfare data. Additionally, this study will focus on youth who had at least one sustained petition (N = 287). Thus, the final sample for this study includes 287 youth who were referred to probation between August 2015 and December 2017, exited probation during that time, and had at least one sustained petition during that time. A sustained petition indicates that the court has determined that a youth has indeed committed an offense (i.e., the equivalent to a guilty verdict in the adult criminal justice system). I chose to focus on youth with at least one sustained petition because the only measure of recidivism in the dataset is a subsequent sustained petition. Additionally, although imperfect, sustained petitions are the best available measure of whether an offense actually occurred. Therefore one can reasonably consider youth with an initial sustained petition to have engaged in illegal behaviors,

and youth with additional sustained petitions can reasonably be considered to have engaged in recidivating offenses. Recidivism data was measured through June 2019, allowing for 18 months of follow-up data for all youth in the sample. Youth with two or more sustained petitions were considered to have recidivated. The dataset does not indicate how many (if any) previous referrals to probation each youth had prior to August 2015, although the dataset does contain an indicator of whether each youth had any previous sustained juvenile justice petitions, which will be used as a covariate as described below.

Data

The administrative dataset from SCCPD contains a rich set of juvenile justice indicators, child welfare indicators, and covariates. Juvenile justice data are drawn from administrative data from Santa Clara County Probation and include variables such as initial probation referral date, as well as date and type for all subsequent sustained petitions. Administrative data from the probation risk assessment tool, which examines risk of recidivism, is also included. While the sample for the dataset was defined as youth who were referred to probation between August 2015 and December 2017, recidivism data for these youth are measured through June 2019, allowing for 18 months of follow-up data for all youth in the sample. Additionally, the dataset contains administrative child welfare data that probation staff obtained directly from California's statewide Child Welfare Services Case Management System (CWS/CMS), which is the case management system utilized by the child welfare system. Beginning in August 2015, probation staff obtained child welfare histories for all youth referred to probation by looking up the youth's child welfare history in the statewide CWS/CMS system. Child welfare variables available to and recorded by probation staff include the number of child welfare referrals for the youth and the outcome of these referrals (substantiated, inconclusive, unfounded, or evaluated out). The dataset also contains youths' self-report of abuse obtained from the probation risk assessment tool, which will allow my analyses to examine self-reported maltreatment and official child welfare system involvement as separate concepts. Finally, the data contain numerous covariates drawn from probation's case management and risk assessment data, including age, race, gender, recidivism risk score, number of prior sustained petitions, zip code median income, school enrollment status, gang involvement, and substance use. These variables are described in more detail below.

Methods

Analyses were conducted using targeted maximum likelihood estimation (TMLE; van der Laan & Rose, 2011). TMLE is a doubly robust, semi-parametric statistical approach that uses estimates of both the treatment mechanisms and the outcome regressions. TMLE was chosen for this study because it rigorously controls for associations between confounders and both treatment and outcomes, making it a particularly useful method for examining causal questions using quasi-experimental designs where comparison groups may not be equivalent at baseline. Results from TMLE can be interpreted as causal when two key assumptions are met: 1) there is no unmeasured confounding (i.e., randomization assumption), and 2) there is a non-zero probability of being both exposed and unexposed (here, to either maltreatment or the child welfare system), irrespective of the values of confounders (i.e., theoretical positivity assumption).

TMLE generates predicted outcome values for each individual under each exposure (or “treatment”)³ level of interest accounting for covariates, which allows for a comparison of the expected counterfactual outcome if all youth received the exposure versus if no one received the exposure. As the exposure variables of interest in this study are a history of self-reported maltreatment (yes/no) and a history of maltreatment as recorded in the administrative CWS/CMS system (yes/no), I used point-treatment TMLE to examine the average exposure effect (see Appendix A for the full causal roadmap). I used influence-curve based confidence intervals for inference on the TMLE point estimates.

Within TMLE, I used SuperLearner to estimate the treatment mechanism and outcome regression. SuperLearner combines a library of machine learning algorithms and parametric models to build an estimator that performs (asymptotically) as well as—or better than—any candidate algorithm in the library (if a correctly specified parametric model is not in the library). Analyses were performed using R version 4.0.0 using the “ltmle” package for TMLE analyses (Gruber et al., 2020) and the “SuperLearner” package to estimate the treatment mechanism and outcome regression (Polley et al., 2021). I used the ltmle default library of SuperLearner candidates.

Variables

The following variables were utilized in my analyses. A youth’s baseline timepoint is defined as the date of their initial referral to probation during the qualifying time period for this study (i.e., the date of their earliest referral to probation between August 2015 – December 2017). The dataset does not indicate how many previous referrals to probation each youth had.

Exposure variables (i.e., “treatment” or independent variables)

The first exposure of interest in this study is maltreatment. Maltreatment was operationalized as the youth’s self-reported history of maltreatment during baseline risk assessment (yes/no). Self-reported maltreatment was assessed using the following question: “Were you ever abused by your parents?”.

The second exposure of interest is a history of child welfare system involvement. This exposure variable was operationalized in two ways, First, a history of child welfare *involvement* was operationalized as a confirmed history of substantiated allegations in the baseline child welfare check (yes/no). In their standard checks of the child welfare CWS/CMS case management system, SCCPD staff record whether a youth has had any child welfare referrals (i.e., a concerned party called the county child welfare hotline to report suspected maltreatment) and whether any of the allegations from these referrals were substantiated. A substantiated allegation indicates that a child welfare worker interacted with the youth and family to investigate a suspected maltreatment referral and, at the conclusion of their investigation, the child welfare worker determined that maltreatment did occur. Furthermore, administrative child welfare data from Santa Clara County show that among children with at least one substantiated child maltreatment allegation from 2013-2017, 70.13% had a case opened at some point (S. Cuccaro-Alamin, personal communication, March 24, 2021), indicating that youth with substantiated allegations are highly likely to have further involvement with the child welfare system. Second, a history of child welfare *investigations* was operationalized as a confirmed

³ In various disciplines, the independent variable of interest may be referred to as the exposure variable, predictor variable, or treatment variable. For sake of consistency and to reflect common terminology in causal inference, the independent variables in this study will be referred to as exposure variables.

history of investigated allegations in the baseline child welfare check (yes/no). Youth were considered to have a history of child welfare investigations if they had any allegations that were substantiated, unfounded, or inconclusive, as this indicates that a child welfare worker conducted an investigation of maltreatment allegations related to the youth and made a determination regarding those allegations.

Outcome variables. The outcome of interest in this study is recidivism. The primary way recidivism was operationalized was a subsequent sustained petition within 18 months after the first sustained petition that occurred after August 2015 (yes/no). I also examined secondary indicators of recidivism including any sustained petition after initial sustained petition (yes/no) and any felonies in recidivating events (yes/no).

Covariates. In each model, I controlled for the following covariates:

1. Age – youth’s age at the time of their initial referral to probation.
2. Gender – categorical variable indicating if the youth was male or female. The sample did not include any youth who were entered into the probation case management system as trans, non-binary, or another gender identity.
3. Race – categorical variable indicating if probation staff entered the youth into the probation case management system as Black, White, Latinx, or Other race. Because of low frequencies, youth who were reported to be a race other than Black, White, or Latinx were coded into a combined category of Other race.
4. Baseline recidivism risk level – categorical variable indicating the youth’s baseline risk of recidivating (low, moderate, or high). Risk level in this dataset was assessed using five factors: not enrolled in school, involved in gang, substance abuse, moderate or high on JAIS (i.e., probation’s standard risk assessment), and first referral was for a felony against people or property crime. For my analyses, a risk score of zero was coded as “low,” a risk score of 1-2 was coded as “moderate,” and a risk score of 3-5 was coded as “high.”
5. Any prior sustained petitions – binary variable (yes/no) indicating if the youth had any previous sustained juvenile justice petitions prior to their baseline referral to probation for this study (i.e., any sustained petitions prior to their qualifying referral between August 2015 – December 2017). A sustained petition indicates that the youth has previously been found to have committed an illegal offense.
6. Zip code median income – I utilized the median income for the youth’s zip code as a covariate, which is the closest measure of socioeconomic status included in the dataset.

Moderation. My third aim is to test whether self-reported maltreatment moderates the effects of child welfare system involvement on recidivism. I approached this aim as a TMLE moderation analysis. For the models that utilized child welfare involvement as the exposure variable, I examined whether the youth’s history of self-reported maltreatment moderated the effect of child welfare involvement on recidivism. I used a marginal structural model (MSM) estimated with TMLE to examine whether child welfare involvement moderated the relationship between maltreatment and recidivism (see Appendix A for MSM specification). The child welfare involvement X maltreatment interaction on the MSM was the parameter of interest. I chose a moderation approach rather than a mediation approach for two primary reasons. First, the temporal order of maltreatment and child welfare involvement is ambiguous, so it is not possible

to establish the causal pathway necessary for a mediation analysis. While it may be reasonable to assume that in most cases maltreatment occurs prior to child welfare involvement, the time ordering of maltreatment and child welfare involvement is not explicitly known in this dataset. Both are asked at baseline, and the data reflects whether the youth *ever* had a history of either experience. Second, I am primarily interested in whether having both experiences leads to higher risk of recidivism (moderation approach), not the direct and indirect causal pathways of each experience (mediation approach).

Chapter 4: Results

Data Exploration

Prior to conducting the TMLE analyses, I explored missingness and baseline descriptives.

Missingness

Among the 287 youth in the study sample, 85 (29.6%) were missing data for self-reported maltreatment (exposure variable), 40 (13.9%) were missing data for child welfare history (exposure variable), 9 (3.1%) were missing data for baseline risk level (covariate), and 21 (7.3%) were missing data for zip code median income (covariate). I assumed this data is Missing at Random (MAR). The data is not Missing Completely at Random (MCAR), as chi-squared testing found that missingness is related to other variables such as age and risk level. However, in extensive conversations with SCCPD, we determined that it is reasonable to assume that the data is MAR and not Missing Not at Random (MNAR). For instance, there is no reason to expect that youth with missing child welfare history data are more or less likely to have a child welfare history than youth not missing these data. The reasons for missingness are likely due to other factors such as data entry errors.

With the assumption that the missing data are MAR, I imputed missing values for covariates using multivariate imputation by chained equations via the R package “mice” (van Buuren et al., 2021). I examined the distribution of the imputed values and found no significant differences between the imputed values and non-imputed values. I also included indicators of missingness in the TMLE analyses. For missing exposure variables, I created a missingness indicator (Δ , where 1=not missing and 0=missing) and incorporated this into the TMLE code as an additional “intervention” variable for Aims 1 and 2 (i.e., estimated the expected counterfactual outcome under exposed versus unexposed states, incorporating an additional hypothetical intervention to ensure complete measurement of the exposure). For the Aim 3 MSMs, I only included youth who had complete data for the exposure and moderator variables (N=187).

Covariates

My initial data exploration also led to the exclusion of some covariates and the collapsing of others. In my initial conceptualization of this analysis, I planned to include school enrollment status, substance use, and gang involvement as covariates. However, the amount of missing data for these covariates was so substantial (21.9% missing for school enrollment status, 28.9% missing for substance abuse, and 38.7% missing for gang involvement) that I decided to exclude them. These factors are accounted for within the risk score. Additionally, I binned ordered categorical covariates that originally had cells with very low frequencies. For risk score, I binned scores of zero as “low,” scores of 1-2 as “moderate” and scores of 3-5 as “high,” as there were very low frequencies when coding the variable as a continuous variable from zero to five. For history of sustained petitions prior to qualifying referral, I originally planned to use this as a continuous variable. However, upon discovering that the majority of the sample did not have any previous sustained petitions, I binned history of sustained petitions into a binary yes/no variable.

Baseline descriptives

The final baseline descriptives are displayed in Tables 1-3. The sample of 287 youth had a mean age of 15.78 and was primarily male (82.6%). The majority of youth were Latinx

(72.5%). Most youth did not have a history of previous sustained petitions (82.9%), and moderate risk was the most common risk score (59.9%). Table 1 shows the baseline descriptives for youth with and without self-reported maltreatment; Table 2 shows the baseline descriptives for youth with and without a history of substantiated child welfare allegations; and Table 3 shows the baseline descriptives for youth with and without a history of child welfare investigations. Chi-squared and t-tests showed no significant baseline differences between youth with and without a history of self-reported maltreatment, and no significant baseline differences between youth with child welfare histories and those without child welfare histories. There were significant baseline differences regarding age and risk level for youth with and without histories of child welfare investigations. Youth with no history of child welfare investigations were slightly older and their risk levels were lower than youth with a history of investigations. An examination of practical positivity violations is included in Appendix A.

Results

Tables 4 and 5 display the TMLE and MSM results that have not been adjusted for baseline covariates. As shown in Table 6, results of the adjusted TMLE analyses did not indicate that maltreatment increased the risk of recidivism, nor did child welfare system involvement increase the risk of recidivism. Similarly, results of the adjusted MSM moderation analyses did not yield any significant results (see Table 7), indicating that self-reported maltreatment did not moderate the relationship between child welfare involvement and recidivism.

Aim 1 (Models 1-3)

Aim 1 was to test whether a history of self-reported maltreatment increases the risk of recidivism for youth with juvenile justice involvement. As shown in Table 6, the probability of recidivating within 18 months was 2.9% higher for youth with a history of self-reported maltreatment than for youth without one, however this difference was not statistically significant at the 5% level (95% CI: -15.6, 21.3; $p = 0.78$). I also examined different operationalizations of the outcome variable. In addition to examining recidivism within 18 months, I examined any recidivism (i.e., no time limit) and whether the youth had any felonies in recidivating events. Different operationalizations of the outcome variable did not yield any significant results. Therefore, my hypothesis that self-reported maltreatment will increase the risk of recidivism for youth with juvenile justice involvement was not supported.

Aim 2 (Models 4-9)

Aim 2 was to test whether a history of child welfare system involvement increases the risk of recidivism for youth with juvenile justice involvement. When examining child welfare history, there were also null results. As shown in Table 6, the probability of recidivating within 18 months was 1.8% higher for youth who had a history of child welfare system involvement (i.e., substantiated allegations) than for youth who did not, however this difference was not statistically significant at the 5% level (95% CI: -12.3, 16.0; $p = 0.80$). For youth with a history of child welfare investigations, the probability of recidivating within 18 months was 2.0% lower compared to youth without a history of child welfare investigations, but this difference was also not statistically significant (95% CI: -13.3, 9.3; $p = 0.73$). Again, different operationalizations of the outcome variable did not yield any significant results. Thus, my hypothesis that child welfare system involvement will increase the risk of recidivism for youth with juvenile justice involvement was not supported.

Aim 3 (Models 10-12)

Aim 3 was to test whether self-reported maltreatment moderates the effect of child welfare involvement on recidivism. Among the 187 youth who had complete data for the exposure and moderator variables, 130 youth (69.5%) had neither a history of child welfare involvement or self-reported maltreatment; 12 (6.4%) had both a history of child welfare involvement and self-reported maltreatment; 26 (13.9%) had a history of child welfare involvement but no history of self-reported maltreatment; and 19 (10.2%) had a history of self-reported maltreatment but no history of child welfare involvement. My hypothesis that child welfare system involvement and self-reported maltreatment will interact (such that youth with both system involvement and self-reported maltreatment will have the greatest risk for recidivism) was not supported. Results of the MSM moderation analyses did not yield any significant results (see Table 7), indicating that self-reported maltreatment did not moderate the relationship between child welfare involvement and recidivism.

Table 1*Baseline descriptives – self-reported maltreatment as exposure variable*

Baseline covariates	Total N=287		No history of self-reported maltreatment N=170		History of self- reported maltreatment N=32		Missing history of self-reported maltreatment N=85	
	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %
Age	15.78 $\pm$ 1.39	-	15.54 $\pm$ 1.36	-	15.21 $\pm$ 1.36	-	16.47 $\pm$ 1.18	-
Gender								
Male	82.6%	237	84.7%	144	71.9%	23	82.4%	70
Female	17.4%	50	15.3%	26	28.1%	9	17.6%	15
Race								
Black	7.7%	22	7.1%	12	3.1%	1	10.6%	9
White	11.1%	32	7.6%	13	18.8%	6	15.3%	13
Latinx	72.5%	208	77.1%	131	68.8%	22	64.7%	55
Other	8.7%	25	8.2%	14	9.4%	3	9.4%	8
Risk level								
Low	9.8%	28	7.6%	13	6.3%	2	15.3%	13
Moderate	59.9%	172	54.7%	93	65.6%	21	68.2%	58
High	27.2%	78	35.9%	61	28.1%	9	9.4%	8
Missing	3.1%	9	1.8%	3	0.0%	0	7.1%	6
Any previous sustained								
Yes	17.1%	49	9.4%	16	6.3%	2	36.5%	31
No	82.9%	238	90.6%	154	93.8%	30	63.5%	54
Zip code median income	99,152.02 $\pm$ 27,405.66	-	98,216.81 $\pm$ 26,471.18	-	95,339.10 $\pm$ 23,682.63	-	102,910.90 $\pm$ 30,737.39	-
Outcome								
Recidivism within 18 mos								
Yes	44.9%	129	55.3%	94	59.4%	19	18.8%	16
No	55.1%	158	44.7%	76	40.6%	13	81.2%	69
Any recidivism								
Yes	47.7%	137	58.2%	99	62.5%	20	21.2%	18
No	52.3%	150	41.8%	71	37.5%	12	78.8%	67
Any felonies								
Yes	39.7%	114	50.0%	85	56.3%	18	12.9%	11
No	60.3%	173	50.0%	85	43.8%	14	87.1%	74

Note: there were no statistically significant baseline group differences between those with and without a history of self-reported maltreatment.

Table 2*Baseline descriptives – child welfare allegations as exposure variable*

Baseline covariates	Total N=287		No history of substantiated CW allegations N=193		History of substantiated CW allegations N=54		Missing history of substantiated CW allegations N=40	
	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %
Age	15.78 $\pm$ 1.39	-	15.77 $\pm$ 1.39	-	15.38 $\pm$ 1.31	-	16.37 $\pm$ 1.26	-
Gender								
Male	82.6%	237	81.9%	158	85.2%	46	82.5%	33
Female	17.4%	50	18.1%	35	14.8%	8	17.5%	7
Race								
Black	7.7%	22	7.3%	14	11.1%	6	5.0%	2
White	11.1%	32	10.4%	20	11.1%	6	15.0%	6
Latinx	72.5%	208	72.0%	139	72.2%	39	75.0%	30
Other	8.7%	25	10.4%	20	5.6%	3	5.0%	2
Risk level								
Low	9.8%	28	6.7%	13	11.1%	6	22.5%	9
Moderate	59.9%	172	62.7%	121	46.3%	25	65.0%	26
High	27.2%	78	27.5%	53	40.7%	22	7.5%	3
Missing	3.1%	9	3.1%	6	1.9%	1	5.0%	2
Any previous sustained								
Yes	17.1%	49	14.0%	27	20.4%	11	27.5%	11
No	82.9%	238	86.0%	166	79.6%	43	72.5%	29
Zip code median income	99,152.02 $\pm$ 27,405.66	-	99,786.80 $\pm$ 27,818.65	-	93,873.94 $\pm$ 24,533.32	-	103,144.50 $\pm$ 28,702.14	-
Outcome								
Recidivism within 18 mos								
Yes	44.9%	129	46.6%	90	55.6%	30	22.5%	9
No	55.1%	158	53.4%	103	44.4%	24	77.5%	31
Any recidivism								
Yes	47.7%	137	49.7%	96	59.3%	32	22.5%	9
No	52.3%	150	50.3%	97	40.7%	22	77.5%	31
Any felonies								
Yes	39.7%	114	44.0%	85	44.4%	24	12.5%	5
No	60.3%	173	56.0%	108	55.6%	30	87.5%	35

Note: there were no statistically significant baseline group differences between those with and without a history of substantiated allegations.

Table 3*Baseline descriptives – child welfare investigations as exposure variable*

Baseline covariates	Total N=287		No history of CW investigations N=115		History of CW investigations N=132		Missing history of CW investigations N=40	
	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %	% or Mean $\pm$ SD	N for %
Age*	15.78 $\pm$ 1.39	-	15.93 $\pm$ 1.41	-	15.47 $\pm$ 1.33	-	16.37 $\pm$ 1.26	-
Gender								
Male	82.6%	237	85.2%	98	80.3%	106	82.5%	33
Female	17.4%	50	14.8%	17	19.7%	26	17.5%	7
Race								
Black	7.7%	22	7.0%	8	9.1%	12	5.0%	2
White	11.1%	32	8.7%	10	12.1%	16	15.0%	6
Latinx	72.5%	208	73.0%	84	71.2%	94	75.0%	30
Other	8.7%	25	11.3%	13	7.6%	10	5.0%	2
Risk level*								
Low	9.8%	28	10.4%	12	5.3%	7	22.5%	9
Moderate	59.9%	172	65.2%	75	53.8%	71	65.0%	26
High	27.2%	78	20.9%	24	38.6%	51	7.5%	3
Missing	3.1%	9	3.5%	4	2.3%	3	5.0%	2
Any previous sustained								
Yes	17.1%	49	16.5%	19	14.4%	19	27.5%	11
No	82.9%	238	83.5%	96	85.6%	113	72.5%	29
Zip code median income	99,152.02 $\pm$ 27,405.66	-	99,245.12 $\pm$ 27,299.65	-	97,913.31 $\pm$ 27,227.09	-	103,144.50 $\pm$ 28,702.14	-
Outcome								
Recidivism within 18 mos								
Yes	44.9%	129	45.2%	52	51.5%	68	22.5%	9
No	55.1%	158	54.8%	63	48.5%	64	77.5%	31
Any recidivism								
Yes	47.7%	137	45.2%	52	57.6%	76	22.5%	9
No	52.3%	150	54.8%	63	42.4%	56	77.5%	31
Any felonies								
Yes	39.7%	114	40.9%	47	47.0%	62	12.5%	5
No	60.3%	173	59.1%	68	53.0%	70	87.5%	35

*Baseline group differences $p < 0.05$ between those with and without a history of child welfare investigations.

Table 4*Unadjusted TMLE results*

Model	Exposure variable	Outcome variable	Point Estimate	95% CI
Model 1	Self-reported maltreatment	Recidivating sustained petition within 18 mos	4.1%	-14.5, 22.7
Model 2	Self-reported maltreatment	Any recidivating sustained petition(s)	4.3%	-14.1, 22.6
Model 3	Self-reported maltreatment	Any felonies in recidivating petitions	6.3%	-12.5, 25.0
Model 4	History of substantiated allegations	Recidivating sustained petition within 18 mos	8.9%	-6.1, 24.0
Model 5	History of substantiated allegations	Any recidivating sustained petition(s)	9.5%	-5.4, 24.4
Model 6	History of substantiated allegations	Any felonies in recidivating petitions	0.01%	-14.6, 15.4
Model 7	History of CW investigation	Recidivating sustained petition within 18 mos	6.3%	-6.2, 18.8
Model 8	History of CW investigation	Any recidivating sustained petition(s)	12.4%	-0.001, 24.8
Model 9	History of CW investigation	Any felonies in recidivating petitions	6.1%	-6.3, 18.5

Table 5*Unadjusted MSM moderation*

Variable	Recidivating sustained petition within 18 mos (Model 10)		Any recidivating sustained petition(s) (Model 11)		Any felonies in recidivating petitions (Model 12)	
	OR	95% CI	OR	95% CI	OR	95% CI
Any substantiated allegations (treatment)	1.52	0.63, 3.67	1.60	0.65, 3.96	1.38	0.55, 3.01
Self-reported maltreatment (moderator)	1.38	0.51, 3.74	1.22	0.45, 3.30	1.61	0.60, 4.37
Any substantiated allegations X self-reported maltreatment	0.54	0.10, 3.00	0.73	0.12, 4.29	0.45	0.08, 2.49
Intercept	1.24	0.88, 1.75	1.41	0.99, 2.00	1.06	0.75, 1.50

Table 6*Adjusted TMLE results*

Model	Exposure variable	Outcome variable	Point Estimate	95% CI
Model 1	Self-reported maltreatment	Recidivating sustained petition within 18 mos	2.9%	-15.6, 21.3
Model 2	Self-reported maltreatment	Any recidivating sustained petition(s)	3.2%	-14.9, 21.3
Model 3	Self-reported maltreatment	Any felonies in recidivating petitions	7.5%	-10.8, 25.9
Model 4	History of substantiated allegations	Recidivating sustained petition within 18 mos	1.8%	-12.3, 16.0
Model 5	History of substantiated allegations	Any recidivating sustained petition(s)	1.5%	-12.5, 15.6
Model 6	History of substantiated allegations	Any felonies in recidivating petitions	-5.2%	-18.5, 8.2
Model 7	History of CW investigation	Recidivating sustained petition within 18 mos	-2.0%	-13.3, 9.3
Model 8	History of CW investigation	Any recidivating sustained petition(s)	4.3%	-6.9, 15.6
Model 9	History of CW investigation	Any felonies in recidivating petitions	0.5%	-10.4, 11.5

Table 7
Adjusted MSM moderation

Variable	Recidivating sustained petition within 18 mos (Model 10)		Any recidivating sustained petition(s) (Model 11)		Any felonies in recidivating petitions (Model 12)	
	OR	95% CI	OR	95% CI	OR	95% CI
Any substantiated allegations (treatment)	1.02	0.38, 2.75	0.96	0.36, 2.58	0.89	0.34, 2.29
Self-reported maltreatment (moderator)	1.31	0.49, 3.49	1.11	0.42, 2.96	1.33	0.47, 3.74
Any substantiated allegations X self-reported maltreatment	0.66	0.11, 3.99	0.88	0.15, 5.29	0.56	0.10, 3.16
Intercept	1.27	0.90, 1.80	1.46*	1.03, 2.08	1.12	0.79, 1.57

*p<0.05

Chapter 5: Discussion

This dissertation tested whether a history of self-reported maltreatment increases the risk of recidivism for youth with juvenile justice involvement, whether a history of child welfare system involvement increases the risk of recidivism for youth with juvenile justice involvement, and whether there are differential effects of child welfare system involvement for youth with and without a history of self-reported maltreatment.

While the extant literature has established a relationship between maltreatment and justice system involvement, I did not find a significant relationship between either maltreatment or child welfare system involvement and recidivism in this study. Neither maltreatment nor child welfare system involvement impacted a youth's likelihood of recidivism at 18 months, and there were no moderation effects when examining the interaction between maltreatment and child welfare system involvement. Below I will explore the potential reasons for the divergence of these results from previous research on recidivism and describe directions for future research.

Limitations

There are several limitations to this study. First, this dataset had a small sample size. With the small sample size for this study, it is difficult to draw any causal conclusions. The large confidence intervals in the results illustrate that the sample size is not sufficient to get a reasonably precise estimate. For Aim 3 in particular, only 12 youth had both a history of child welfare involvement and self-reported maltreatment – the main group of interest. Thus, the analysis approach used for Aim 3 illustrates a causally informative method to examine whether self-reported maltreatment moderates the relationship between child welfare system involvement and recidivism, but a larger sample size is needed to provide confidence in the results. The amount of missing data – particularly for the exposure variables – is also a primary limitation. While I have attempted to address this missingness as effectively as possible by imputing the missing covariates using multiple imputation and including indicators for missingness, imputing these values may have biased the results.

A second significant limitation is the narrow scope of the child welfare data and recidivism data available in this study's dataset. The administrative child welfare data collected by SCCPD included only the youth's history of child welfare referrals, allegations, and allegation dispositions. The type and severity of the allegations was not collected, and any further child welfare involvement beyond the referral (e.g., case opening, placement in out-of-home care) was not collected. Furthermore, the child welfare data did not include any details about the timing or youth's age when the maltreatment occurred. These details regarding maltreatment and child welfare have been found to be key factors in the extant literature, and future research would benefit from more detailed child welfare data. Similarly, this study's dataset only included subsequent sustained petitions as the sole measure of recidivism. Other measures of recidivism (e.g., re-arrest, detention) would have been helpful to robustly examine the causal relationship between maltreatment, child welfare involvement, and recidivism.

Third, the exact concepts captured by the exposure variables in this study are somewhat ambiguous. I have used substantiated allegations as an indicator of child welfare involvement, yet it is unclear the extent and depth of child welfare involvement that youth with substantiated allegations have. It does appear that most youth with substantiated allegations in Santa Clara County do go on to have an open case with the child welfare system: administrative child welfare data from Santa Clara County indicate that among children with at least one substantiated child

maltreatment allegation from 2013-2017, 70.13% had a case opened at some point (S. Cuccaro-Alamin, personal communication, March 24, 2021). However, the level of child welfare involvement for these youth with substantiated allegations remains ambiguous and almost certainly varies between youth. I also attempted to account for this limitation by examining any child welfare investigation as another child welfare involvement indicator; however, the dataset lacked more detailed and specific child welfare indicators.

Similarly, the question asking youth to self-report maltreatment is a single, narrowly defined question. The question, “Were you ever abused by your parents?” asks specifically about abuse, not other forms of maltreatment such as neglect, and the word “abused” may be interpreted differently by different youth (e.g., only physical or sexual abuse, not emotional abuse). It is also a single question, whereas multiple questions or a child maltreatment scale would have been helpful to better understand the nature and extent of the youth’s self-reported maltreatment. This question is also asked to youth by probation staff, which may influence how the youth respond.

Finally, in order to interpret TMLE results as causal, there must be no unmeasured confounders. While I have utilized TMLE to attempt to isolate the causal relationships of interest, there are potentially unmeasured confounders (e.g., youth substance use, parental mental health, maltreatment and/or child welfare involvement that occurred after baseline), that limit my ability to draw causal conclusions from this study. Additionally, child welfare involvement could be a confounder when examining the effect of self-reported maltreatment (Aim 1) and vice versa (Aim 2). However, because the causal order of these two experiences is ambiguous and the two are also quite correlated, I did not adjust for each as a potential confounder of the other.

Understanding the results within context

It is important to examine why my study results, particularly related to Aims 1 and 2, did not align with previous literature that has found a relationship between maltreatment and recidivism. One explanation is that this dissertation is one of only a handful of studies that have examined this relationship, and it includes some key elements that help move forward our understanding of maltreatment and recidivism. There is a significant body of literature that has established maltreatment as a risk factor for future juvenile justice involvement, yet there are only a few studies that have examined the outcome of recidivism. Additionally, among these recidivism studies, even fewer include a non-crossover youth comparison group. My study makes a unique contribution by including a non-crossover comparison group and 1) examining the outcome of recidivism using the advanced causal method of TMLE, 2) including key confounders such as previous juvenile justice history, 3) operationalizing recidivism as a subsequent sustained petition, and 4) including a broader sample of probation-involved youth – not just moderate to high-risk youth or detained youth. While previous studies have found a relationship between child welfare involvement and recidivism, they did not include all of these key elements in a single study; thus, my results may provide some evidence that the causal relationship between maltreatment and/or child welfare involvement remains unclear. Additionally, this is only the second known study focused on recidivism to examine maltreatment and child welfare experiences as separate concepts. My results may differ from Baglivio et al.’s (2016) study due to differences in analytic approach (TMLE vs. SEM), differences in the study sample (broad population of youth referred to probation vs. deep-end youth completing residential programs), and/or differences in how maltreatment was operationalized (self-reported maltreatment vs. ACEs).

However, another explanation for why the results from this study differ from previous literature is that the data for this study had several key limitations such as a small sample size, missingness, and ambiguity in operationalizing the variables of interest. These issues limit the causal interpretation that can be drawn from the results and also speak to the need for more rigorous studies in this area. Furthermore, this dissertation attempted to answer questions related to the causal role of maltreatment, child welfare involvement, and recidivism with a dataset that was an alternative, scaled-down version of the originally proposed research plan. I originally planned to obtain and match a longitudinal, administrative probation dataset with a longitudinal, administrative child welfare dataset – a plan that was stymied by the COVID-19 pandemic and the inability to obtain identified data to match probation and child welfare records.⁴ Below I detail directions for future research, which include the originally proposed aims for this dissertation prior to the pandemic.

Future directions for research

The data in this study unfortunately did not allow for a nuanced examination of child welfare system experiences. Future research should examine child welfare system involvement using advanced causal inference methods where the data allows for a more detailed and complete picture of the youth's involvement with the child welfare system, such as data on case openings, out-of-home-placements, and timing of system involvement. For example, it may be that more intensive and longer involvement with the child welfare system for youth who have experienced maltreatment increases the risk of recidivism compared to briefer child welfare involvement. The timing of child welfare system involvement (as it relates to the youth's age) may also be critical in understanding the impact of child welfare involvement on recidivism. Furthermore, some child welfare system experiences, such as multiple out-of-home placement moves, may exacerbate risk for recidivism; other types of child welfare system experiences may be protective against recidivism, such as in-home services that are well-matched to the youth and family's needs. This type of research would help illuminate the specific child welfare experiences and pathways that may be helpful or harmful to a youth's risk of recidivism. Similarly, this study examined only one measure of self-reported maltreatment, which was whether the youth reported ever being abused; the type, severity, and timing of this maltreatment is unknown. These dynamics of maltreatment will be important for future research to consider when examining the causal impact of maltreatment.

Additionally, the data in this study did not allow for a broad examination of recidivism, as the only recidivating events captured were subsequent sustained petitions. While this is a strong measure of recidivism as it indicates a conviction for a recidivating offense, it is not a complete picture of a youth's ongoing contact and involvement with the justice system. The few studies that have examined the outcome of recidivism for crossover youth have varying definitions of recidivism, and future research should examine multiple measures of recidivism in order to better understand whether maltreatment and child welfare involvement have a greater impact on certain measures of recidivism compared to others.

Finally, disentangling the concepts of maltreatment and child welfare involvement is not an easy feat. Self-report measures of maltreatment and child welfare maltreatment records both have limitations and neither one alone is an entirely reliable measure of whether maltreatment did in fact occur. One possible path for future research that aims to study these two distinct

⁴ Due to COVID-19, Santa Clara's county counsel halted their review of all external research requests as they focused on the county's response to the pandemic.

experiences could utilize data where past maltreatment has been confirmed via both self-report and official child welfare records, and then examine outcomes for youth who had ongoing contact with child welfare compared to those who did not.

Conclusion

The topic of crossover youth has been gaining research traction in recent years, but there is still much that is unknown in this area. Namely, the impact of maltreatment/child welfare involvement on juvenile justice recidivism is not well explored, and the experiences of maltreatment and child welfare system involvement are often conflated. This study utilized an administrative dataset that included both juvenile justice and child welfare indicators to examine risk factors for recidivism using causally informative analytic methods. This study was also one of the first to differentiate between a youth's experience of maltreatment and their involvement with the child welfare system.

Previous literature has indicated that there is a relationship between maltreatment/child welfare involvement and recidivism; however, I did not find that these two experiences impacted risk for recidivism either separately or together. It may be that this study found no relationship among these experiences due to the unique design of this study – including the broader sample used, confounders included, and causal methods used; alternatively, the results may not align with previous literature due to limitations in this study's dataset. How these two distinct experiences may impact juvenile justice outcomes is a policy-relevant question in need of further examination.

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Appendix A

Causal Roadmap

1. Causal Questions

Question 1. Does experiencing maltreatment prior to juvenile justice involvement increase the risk of future recidivism?

Question 2. Does experiencing child welfare involvement prior to juvenile justice involvement increase the risk of future recidivism?

Question 3. Are there differential effects of child welfare system involvement for youth with and without a history of self-reported maltreatment?

2. Target Population

I would like to generalize to the target population of all youth with juvenile justice involvement in the United States, but the data will be from youth with juvenile justice involvement in Santa Clara County who were referred to probation between August 2015 and December 2017, exited probation during that time, and had at least one sustained petition during that time. A youth's baseline timepoint for this analysis is defined as the date of their initial referral to probation during the qualifying time period for this study (i.e., the date of their earliest referral between August 2015 – December 2017).

3. Causal Model

The endogenous nodes, X , in the structural causal model (SCM, denoted as M^F) are:

- W = baseline covariates (age, gender, race, risk score, any previous sustained petitions prior to baseline, zip code median income)
- $\Delta 1$ = Indicator of missingness for history of maltreatment (1=data present, 0=data missing)
- $A1$ = History of maltreatment (yes/no) reported at baseline (i.e., time of qualifying referral to probation)
- $\Delta 2$ = Indicator of missingness for history of child welfare involvement (1=data present, 0=data missing)
- $A2$ = History of child welfare involvement (yes/no) reported at baseline (i.e., time of qualifying referral to probation)
- Y = Subsequent sustained petition within 18 months after initial sustained petition (yes/no)

The exogenous nodes are: $U = (U_W, U_{\Delta 1}, U_{A1}, U_{\Delta 2}, U_{A2}, U_Y) \sim P_U$. I initially make no assumptions about the distribution P_U ; however, independence assumption on the exogenous nodes will be needed for identification, as discussed below.

The structural equations F are:

- $W = f_W(U_W)$
- $\Delta 1 = f_{\Delta 1}(W, U_{\Delta 1})$
- $A1 = f_{A1}(W, \Delta 1, U_{A1})$
- $\Delta 2 = f_{\Delta 2}(W, U_{\Delta 2})$
- $A2 = f_{A2}(W, \Delta 2, U_{A2})$
- $Y = f_Y(W, \Delta 1, A1, \Delta 2, A2, U_Y)$

There are no assumptions about functional form. I have several working exclusion restrictions. First, there is a working exclusion restriction that $\Delta 1$ and $A1$ are not parents of $\Delta 2$ and $A2$, and similarly $\Delta 2$ and $A2$ are not parents of $\Delta 1$ and $A1$. Because the causal order of these two experiences is ambiguous and the two are also quite correlated, I will not adjust for each as a potential confounder of the other. Additionally, because I understand $A1$ and $A2$ to be missing at random, W is not a parent of $\Delta 1$ or $\Delta 2$, and $\Delta 1$ and $\Delta 2$ are not parents of Y .

Figure 1 below displays a causal graph representing the SCM.

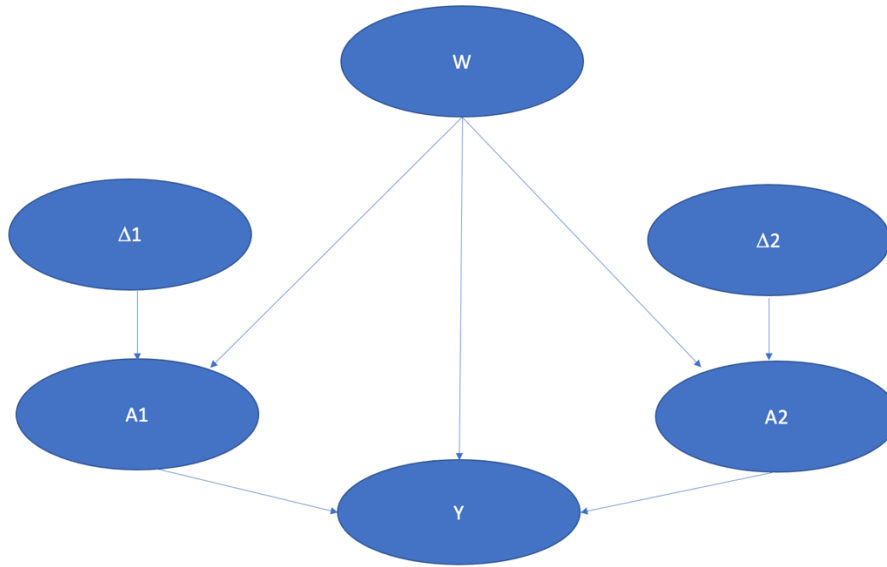


Figure 1. Causal graph

4. Target Causal Parameter

For questions 1 and 2, I am interested in the causal risk of recidivism (i.e., the average treatment effect) due to maltreatment (question 1) and child welfare involvement (question 2). The target causal parameter for question 1 (using $\Delta 1$ and $A1$) and question two (using $\Delta 2$ and $A2$) is:

$$\Psi^F(\mathbb{P}_{U,X}) = \mathbb{E}_{U,X}[Y_{\Delta=1,a=1}] - \mathbb{E}_{U,X}[Y_{\Delta=1,a=0}]$$

The counterfactual outcomes are the probability of recidivism if all youth experienced maltreatment (question 1) or child welfare involvement (question 2) and the probability of recidivism if no youth experienced maltreatment (question 1) or child welfare involvement (question 2), with no students missing exposure data.

5. Specify Observed Data

I assume that the observed data $O = (W, \Delta 1, \Delta 1A1, \Delta 2, \Delta 2A2, Y) \sim P_0$ were generated by sampling n *i.i.d.* times from a data generating system compatible with the structural causal model M^F . There is no missingness in Y . Missing data for W s were imputed using the R package ‘mice’ and missingness indicators were included as covariates. For missing A variables in questions 1 and 2, I created a missingness indicator (Δ , where 1=not missing and 0=missing) and

incorporated this into the TMLE code. (See main document for a more detailed description of missing data and imputation methods.)

6. Identification

In the original SCM M^F , the target causal parameter is not identified from the observed data distribution. In order for the causal parameter to be identified, both the positivity assumption and randomization assumption must hold.

The positivity assumption states that there must be some positive probability of both having a non-missing exposure ($\Delta=1$) and having each level of the exposure ($A=1$ and $A=0$). I do not see any theoretical violations of the positivity assumption, as no particular combination of the baseline covariates should preclude a youth from having experienced maltreatment or child welfare involvement, nor deterministically predict that the exposure level is not measured.

The randomization assumption states that the counterfactual outcome is independent of the observed intervention nodes (here Δ_1 and A_1 for question 1 and Δ_2 and A_2 for question 2) given

measured covariates, or $Y_{a,\Delta} \perp\!\!\!\perp \Delta, A | W$. This assumption is implied if W blocks all backdoor paths from A and Δ to Y . For this to hold, we require the following additional assumptions:

$$U_A \perp\!\!\!\perp U_Y$$

$$U_A \perp\!\!\!\perp U_W$$

$$U_\Delta \perp\!\!\!\perp U_Y$$

$$U_\Delta \perp\!\!\!\perp U_W$$

M^{F*} denotes the original SCM augmented by these additional causal assumptions needed for identifiability.

While these assumptions are needed for identifiability, it does not mean they are true. There may be unobserved confounders creating backdoor paths between A and Y since this is an observational study and not a randomized trial. This study does controls for several confounders that have not been widely used in previous studies in this area, such as zip code median income. However, other potential confounders that were not measured include factors such as parental mental health and youth substance use, which limit my ability to truly interpret the results as causal.

7. Estimand

Questions 1 and 2. Under the working SCM M^{F*} , the average treatment effect is identified as a function of the observed data distribution P_0 using the G-Computation formula. The estimand for question 1 (using Δ_1 and A_1) and question two (using Δ_2 and A_2) is:

$$\Psi^F(\mathbb{P}_0) = \mathbb{E}_0[\mathbb{E}_0(Y|\Delta = 1, A = 1, W) - \mathbb{E}_0(Y|\Delta = 1, A = 0, W)] = \sum_w \mathbb{E}_0[\mathbb{E}_0(Y|\Delta = 1, A = 1, W = w) - \mathbb{E}_0(Y|\Delta = 1, A = 0, W = w)]\mathbb{P}_0(W = w)$$

Question 3. The working MSM for the moderating effect of maltreatment on child welfare involvement is:

$$E(Y_{a1}|A2) = \beta_0 + \beta_{1a1} + \beta_2 A2 + \beta_{3a1} A2$$

(The sample for question 3 excluded youth with missing data for A1 or A2.)

8. Estimation

Estimation was conducted using targeted maximum likelihood estimation (TMLE; van der Laan & Rose, 2011). Within TMLE, I used SuperLearner to estimate the treatment mechanism and outcome regression. I used the ltmle default library of SuperLearner candidates, which includes generalized linear models (SL.glm; with and without correlation screening algorithm), stepwise forward and backward regression by AIC (SL.stepAIC; with and without correlation screening algorithm), Bayes' generalized linear model (SL.bayesglm; with and without correlation screening algorithm), stepwise forward regression by AIC (SL.step.forward; with correlation screening algorithm), stepwise forward and backward regression with pairwise interactions (SL.step.interaction; with correlation screening algorithm). The p-values and 95% confidence intervals generated by TMLE using SuperLearner were used for influence-curve based inference.

I examined the data for practical positivity violations by generating the predicted probability of experiencing the exposure given covariates (using youth from the sample who were not missing data for the exposure variable). If the summary of the estimated treatment mechanism ($\hat{g}(A|W)$) is bounded away from 0 and 1, then this indicates that practical positivity is not a significant concern. For A1 (self-reported maltreatment), the estimated probability of experiencing the exposure given covariates ranged from 0.03 to 0.65, and for A2 (history of substantiated allegations), the estimated probability of experiencing the exposure given covariates ranged from 0.04 to 0.57. These values are bounded well away from 1, but the low minimum values may indicate some possible practical positivity violations. When A was alternatively defined as a history of child welfare investigations, the estimated probability of experiencing the exposure given covariates ranged from 0.21 to 0.84. These values are far enough away from 0 and 1 that I do not have any substantial concerns about practical positivity.