The effect of the ZERO TO THREE Court Teams initiative on types of exits from the foster care system — A competing risks analysis

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ARTICLE INFO

ABSTRACT

ZERO TO THREE: National Center for Infants, Toddlers, and Families developed the Court Teams for Maltreated Infants and Toddlers initiative to accelerate the time to permanency for young children in the child welfare system. This paper considers how the Court Teams children exit the child welfare system. Court Teams children from the four initial sites (n = 298) are compared to a group of similar cases from the National Survey of Child and Adolescent Well-Being (NSCAW) (n = 511). Propensity score weights are combined with a competing risks analysis to isolate program effect on types of foster care exits. Findings indicate that Court Teams cases experience a different pattern of exits from the foster care system. Reunification is the most common type of exit for Court Teams cases (38%) while adoption is the most prevalent for the comparison group (41%). Descriptive data suggest that Court Teams children exit the foster care system faster regardless of the type of exit. The competing risks analysis shows that Court Teams children are significantly more likely to exit foster care for reunification, relative custodianship, and non-relative legal guardianship rather than stay in foster care.

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1. Introduction

Foster care should provide a safe, temporary haven for abused or maltreated children. While the children stay in foster care, the parents have an opportunity to demonstrate their ability to provide an appropriate home. During that period, parents may work with child welfare staff to design a service plan. If after that period, the parents are still judged unable to care for the child, the child welfare worker seeks a suitable, alternative home. The U.S. Department of Health and Human Services recognizes four ways a young child can exit the child welfare system: reunification with a parent or caregiver; adoption; placement with a relative custodian; or placement with a non-relative legal guardian (U.S. Department of Health and Human Services, Administration on Children, Youth and Families, Children's Bureau, n.d.). Each way of exiting foster care typically requires different lengths of time. On average, reunification occurs most quickly while adoption involves more time (Akin, 2011; Wulczyn, 2003).

Reunification is the most common permanency goal. When parents show some progress in achieving their service plans, then reunification remains a possibility. However, when parents progress only minimally and/or parental rights are terminated, then no appropriate permanent home may exist. In those situations, children can linger in the child welfare system. This phenomenon is known as foster care drift (Barth, Wulczyn, & Crea, 2004).

The Adoption and Safe Families Act (ASFA) was enacted in 1997 to shorten the time children stay in foster care. Among its mandates, ASFA compels states to terminate parental rights (TPR) when the child has been in out of home placement for 15 of the previous 22 months (though children in kinship care are exempt) (Lyons, 2001); to hold a permanency hearing within 12 months of initial placement (American Bar Association, 1997); and to have child welfare workers identify a suitable back-up permanency plan (Barth et al., 2004). In the three years following ASFA's enactment the mean time to exit foster care increased slightly (from 11 months to 12 months) and the median time fell (from 43 months to 39 months) (General Accounting Office, 2002).

ASFA also provides states an economic incentive to place children in adoptive homes. Adoptions rose 64.5% in the three years following ASFA's enactment and then leveled off (US Department of Health and Human Services, Administration on Children, Youth and Families, Children's Bureau, 2006). In 2008, roughly 55,000 were adopted, representing just 31% of the children eligible for adoption (U.S. Department of Health and Human Services, Administration for Children and Families, Children's Bureau, 2009). A multivariate analysis of the Multistate Foster Care Data Archive found no significant decrease in mean time to complete adoption since ASFA's enactment (F. H. Wulczyn, Chen, & Hislop, 2006). Clearly, unmet need remains (Becker, Jordan, & Larsen, 2007).

In response, ZERO TO THREE: National Center for Infants, Toddlers, and Families (ZTT) has developed the Court Teams for Maltreated Infants and Toddlers initiative to accelerate the time to permanency for

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young children in the child welfare system. The Court Teams model is implemented at the local level. The initiative links a judge with a project coordinator to bring together a group of local stakeholders to develop a plan for the local community. Those involved include the department of social services, legal representatives, court appointed special advocates (CASA), service providers, and so on (i.e. the court team). Their plan incorporates other key components of the model including monthly case reviews, as well as child–parent psychotherapy, evidence-based parenting services, and early intervention screening and services. The ZTT national office provides training, technical assistance, resource materials, and program monitoring. The local court team also ensures that ASFA requirements are met in a timely manner. Twelve projects have been funded to date, primarily through the U.S. Department of Justice. Four have children who reached permanency by the end of 2009.

ZTT Court Teams focus on reducing time to permanency regardless of how the child exits foster care. The program does not specifically advocate for reunification, adoption, relative custodianship, or non-relative guardianship. Instead, it works to reduce the time the child is in flux and to foster a positive bond between the caregiver and the child. A companion paper to this current study finds that on average, children in the ZTT Court Teams program exit the child welfare system nearly 3 times as fast as a group of similar children from the National Survey of Child and Adolescent Wellbeing (NSCAW), a nationally representative sample of children in the child welfare system (p<0.01) (McCombs-Thornton, 2011a). Given that reunification and adoption require different lengths of time, the program effect may reflect changes in how children exit the system rather than a true acceleration of the process regardless of type of exit. This current paper considers how the ZTT children exit the child welfare system. ZTT Court Teams children are compared to a group of similar cases from NSCAW. Propensity score analysis is combined with a competing-risks hazard analysis to isolate program effect on types of foster care exits. Any differences may help explain how the program actively reduces time to permanency. This paper first reviews the child welfare literature predicting ways of exiting foster care. It then discusses the study methods including a description of both datasets and statistical approaches. A presentation of the results follows, concluding with a discussion of the findings, implications, and limitations. This article is the second in a series evaluating the effect of the Court Teams initiative on time to permanency.

2. Previous research

2.1. Types of exits from foster care and time to permanency

Just over 700,000 children were in the U.S. foster care system in FY 2009. Nearly 40% of those children exited the system that year. Of those who did so, half (51%) were reunified with a parent or caregiver, 20% were adopted, 8% lived with a relative custodian, 7% had a legal guardian, and the remainder were either emancipated or lost to follow up. Those who exited were in foster care a mean of 22 months and a median of 13.7 months (U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau, 2010). Data on those who actually exit, however, provides a biased picture of time to exit; it disregards challenging cases that remain open for long periods of time.

Studies using time-to-event or hazard analysis incorporate such censored data and reveals that adoption generally requires much more time in care than any other type of exit (Akin, 2011; Wulczyn, 2003). These studies suggest that adoption takes at least twice as long as reunification, often longer. An analysis of the Multistate Foster Care Data Archive found that the median time in foster care was over 35 months for adopted children, compared to less than 10 months for those who were reunified or placed with a guardian (Wulczyn, 2003). A more recent study using administrative records from a Midwestern state found a similar pattern though markedly different lengths of time in foster care.

Those exiting to adoption were in care a median of 737 days (about 24 months), while those who returned to their parents or caregivers were in child welfare a median of 366 days (or 12 months), and those exiting to guardianship were in foster care a median of 474 days (nearly 16 months) (Akin, 2011).

2.2. Key characteristics related to type of exit

A range of risk factors are associated with each category of exit from the child welfare system. Type of permanency outcome has been found to be related to several child and parent characteristics. Child age is a factor across studies: infants are consistently more likely to be adopted while older children are more likely to be reunified (Akin, 2011; Barth, 1997; Connell, Katz, Saunders, & Tebes, 2006; Courtney & Wong, 1996; Snowden, Leon, & Sieracki, 2008; Winokur, Holtan, & Valentine, 2009; Wulczyn, 2003). Other types of exits are analyzed less often. Older children were more likely to leave foster care for legal guardianship than infants (Akin, 2011). Older children were also more likely to exit to a relative custodian (Wulczyn, 2003). Unlike age, child's gender generally does not predict time to permanency across studies (Connell et al., 2006).

Race and to a lesser extent, ethnicity, also influence type of foster care exit. Many studies have found that African-American children are less likely to experience reunification (Akin, 2011; Barth, 1997; Connell et al., 2006; Courtney & Wong, 1996; Wulczyn, 2003) or adoption (Akin, 2011; Barth, 1997; Courtney & Wong, 1996; Snowden et al., 2008; Wulczyn, 2003). Again, other types of exits are rarely studied, but African-Americans were more likely to exit to relative care in one study. The same analysis found that the effect of race has shrunk over time (F. Wulczyn, 2003). Fewer studies yielded significant findings for Latinos, though several consistently found that as with African Americans, Latino children were also less likely to be adopted (Courtney & Wong, 1996; Snowden et al., 2008; Wulczyn, 2003).

A child's health status also predicts exit type. Unfortunately, common themes are hard to identify because studies define health inconsistently. Several found that some form of disability, either physical or emotional, was linked to a lower chance of reunification (Akin, 2011; Connell et al., 2006; Courtney & Wong, 1996). Findings are less consistent about the effect of disability on adoption. Most found it makes adoption less likely (Connell et al., 2006; Courtney & Wong, 1996; Snowden et al., 2008) while one showed disability linked to a greater likelihood of adoption. The same study found that emotional problems, however, were related to lower rates of adoption (Akin, 2011).

Less evidence exists on the relationship between parental or community factors and type of foster care exits. Some research suggests that children with parental substance abuse are less likely to reunify (McDonald, Poertner, & Jennings, 2007; Rosenberg & Robinson, 2004), or to be adopted (Snowden et al., 2008). Research also indicates that parents with mental illness have been more likely to have their parental rights terminated since the passage of ASFA (Ackerson, 2003; Mullick, Miller, & Jacobsen, 2001). In addition, family poverty may affect how a child is discharged from foster care. Welfare eligibility has been linked with lower rates of reunification or adoption (Courtney, 1994; Courtney & Wong, 1996). Some studies indicated that being from a single parent family was related to lower prospect of reunification (Courtney, 1994; Courtney & Wong, 1996; McDonald et al., 2007). Urbanicity is the only significant community level factor identified in previous research. Across the handful of studies testing urbanicity, children in the most urban areas of each study were less likely to be adopted (Courtney & Wong, 1996; Wulczyn, 2003).

Lastly, several placement characteristics predict how a child exits the foster care system. While many studies found reasons for removal to be significant, these studies are somewhat inconsistent, likely due to differences in definitions (Akin, 2011). Physical maltreatment has been shown to be related to higher rates of

reunification, one of the more consistent findings (Akin, 2011; Courtney & Wong, 1996). While sexual abuse also appears to be significant, the direction of its effect is unclear. A study of children in non-kin foster care found sexual abuse to have a positive association with reunification (Courtney, 1994). Another study found sexual abuse to be associated with lower likelihood of experiencing any type of exit from the child welfare system (Connell et al., 2006). In addition, placement with a relative has been consistently linked to lower rates of reunification (Connell et al., 2006; Courtney & Wong, 1996; Wulczyn, 2003) and adoption (Courtney & Wong, 1996; Winokur et al., 2009; Wulczyn, 2003), and higher rates of discharge to a relative or guardian (Winokur et al., 2009; Wulczyn, 2003).

3. Methods

3.1. Data sources

This study uses two sources of data to assess the effect of the ZTT Court Teams on type of foster care exit. The ZTT management information system provides data on the sample of children in the program. The comparison group is drawn from the National Survey of Child and Adolescent Well-Being (NSCAW).

3.1.1. ZTT Court Teams Management Information System (MIS)
The ZTT community coordinators routinely collect and enter client-level data using a secure, web-based system. Community coordinators gather the data from the child protective services (CPS) family case plan or other child welfare documents and information shared at monthly case review meetings for each family, court hearings, or other discussions they have with service providers and child welfare workers. De-identified data are available on child background, service needs and usage, visitation, placements, and time to permanency.

The ZTT sampling frame encompasses 12 ZTT Court Teams sites scattered throughout the country, including the east coast, south, central Midwest, and far West Coast. Most are in midsize cities, though several are based in very large metropolitan areas and at least one is located in a much smaller city. This current study focuses on the original four sites as they had been open long enough (4 to 5 years) to have accumulated cases that had exited the foster care system by the end of 2010. These sites are in the south and Midwest and represent two larger metropolitan areas, a midsize city, and smaller city. The four sites also differ in racial demographics from all ZTT sites. One is in a predominately African-American location; another is situated in a county with a mix of African Americans and Caucasians; a third is in a racially mixed area also including a large Latino population; and the fourth is in a largely Caucasian county. Across the sites, nearly all children under age three assigned to the Court Teams judges have entered into the program. Assignment to judges is based on age (e.g., all infants and toddlers are assigned to the Court Teams judge in a site) or random assignment, depending on the site. Only one case is known to have refused participation.

The current study includes 298 ZTT cases, including all children in the initial four sites who entered the project by 12/31/2009. This study uses data collected through September 2010, representing a follow up period of one year or more for 94% of ZTT cases.

3.1.2. National Survey of Child and Adolescent Well-Being (NSCAW)
A comparison group is drawn from NSCAW, a nationally representative, longitudinal study of children involved in the child welfare system. The data are a probability-based sample of both open and unopened cases that entered the child welfare system from October 1999 to December 2000 (US Department of Health and Human Services, Administration on Children, Youth and Families, Office of Planning, Research, and Evaluation, 2009). Children age birth to 14 were eligible to participate. To ensure adequate statistical power for some key research questions, the study team oversampled infants, children

experiencing sexual abuse, and those receiving services after the investigation (Dowd, Kinsey, Wheeless, & Thissen, 2008).

NSCAW has collected five waves of longitudinal data, primarily using trained interviewers to administer a uniform computer assisted personal interview (CAPI). Data are extensive, covering family risks, child living environments, services needed and received, child behavior, and child development, among other topics. During most waves, data were collected from the child welfare worker, parent/caregiver, and the child (Dowd et al., 2008). This analysis will use the child welfare worker data in order to best correspond to ZTT's data collected from CPS/professional sources.

The comparison group for this study was selected based on the criteria used for enrollment in all of the ZTT Court Teams projects, namely, experience of a child welfare-supervised out-of-home placement before age three. While location was also a selection criterion for ZTT cases in this study, geographic location is not available in NSCAW to prevent deductive disclosure. Therefore, it was not possible to use location as a selection requirement for the NSCAW comparison group. A total of 511 NSCAW cases were eligible for the comparison group.

3.2. Measures

3.2.1. Dependent and key independent variables
The dependent variable in this study is type-specific risk of exit from the child welfare system. It is a nominal measure, with categories including reunification with parent or caregiver, adoption, relative custodianship, non-relative legal guardianship, or not yet discharged from foster care. The key independent variable is participation in the ZTT Court Teams program, a dichotomous indicator variable.

3.2.2. Covariates
The estimated effect of the ZTT program is the adjusted between-group difference between ZTT participants and the sub-sample of NSCAW participants. This methodology assumes that—conditioning on observed characteristics—between-group comparisons are not affected by unobserved confounding and can be attributed to the ZTT program. This assumption underlies many quasi-experimental methods, such as regression.

Whether this assumption is plausible depends on the choice of covariates. These are chosen based on their ability to confound between-group associations—that is, to predict both the exposure (ZTT participation) and the outcome (placement type). A necessary condition for a potential confounder is that it predicts the outcome, and for that reason, we used prior research on placement (reviewed above) to identify possible confounders. The degree to which the two groups differ on these characteristics reflect (1) differential sample selection in the two studies; (2) factors that determine eligibility for the ZTT program; and (3) selective attrition over time. (We address the last of these with multiple imputation as well. See below.)

Fifteen covariates have been carefully selected to account for the between-group differences between the ZTT and NSCAW children. Child characteristics are measured as a series of dichotomous variables, including infant status at the time of first removal from the home, African American, Caucasian, Latino, and male gender.[2] Parent characteristics are measured as four indicator variables regarding substance abuse issues, severe mental health problems, general poverty, and needing employment assistance. The parent variables were each measured at or near the time that the child was removed from the home for the ZTT Court Teams families. NSCAW measures

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[2] The literature also finds that child disability/emotional issues are linked to time to permanency. Given the age of the sample (two thirds of ZTT cases were infants at the time of entry into the child welfare system), disability and behavior issues largely have not surfaced at this stage and are not available in the data.

represent parent needs within the year or so before the child was taken into child welfare custody. Urbanicity is measured using the USDA Economic Research Service Rural–urban continuum, a seven point scale. Reasons for removal are based on child welfare records and reflect the official categories states are required to report in the Adoption and Foster Care Analysis Reporting System (AFCARS). Dichotomous variables in this study include abandonment, neglect (including medical neglect), physical abuse, psychological maltreatment, and sexual abuse.

The plausibility of the ignorability assumption depends on not only including appropriate covariates in the analyses but also in excluding inappropriate ones. In particular, some variables may predict both placement and exposure yet make a poor choice for use as covariates. These involve characteristics of the child welfare experience, such as initial placement type (e.g., with a relative). However, this type of covariate lies on the causal pathway (a mediator) between participation in the ZTT Court Teams program and the permanency outcome. As illustrated in Fig. 1, this variable acts as a "collider", an outcome of both unobserved factors influencing placement and ZTT participation. Conditioning on a collider creates a spurious correlation between the two determinants of initial placement. In other words, even if our choice of other covariates removed any confounding, conditioning on a collider would (re-)create unobserved confounding.

Fig. 1 illustrates this problem. The unobserved characteristic is represented by the dotted line between ZTT Court Teams participation and family characteristics. Since they are both causes of placement type, if we know if one is not present, then we know that the other must be present (or at least the likelihood of the other being present increases).(Shrier & Platt, 2008) This would bias the estimate of overall program effect on type of foster care exit, the central question of the study. As a result, placement characteristics occurring after enrollment are excluded from the analysis.

3.3. Analytical methods

3.3.1. Missing data

Variables from the ZTT Court Teams and NSCAW were transformed to similar formats and then appended to make one dataset. Like all longitudinal studies, data collected suffered from loss to follow up and item missingness. Data on all ZTT cases are available through the course of their time in the project; no ZTT cases suffered from attrition. NSCAW cases did experience some degree of loss to follow up. Given the longitudinal nature of the survey, however, data for a child whose case worker missed a round of interviews was generally collected during the following wave. Attrition is most evident in the fifth wave of NSCAW. Of the children known to still be in foster care at the end of the study period, only 15% have a wave 5 survey. These cases are treated as censored at the date of their last completed survey.

In terms of item missingness, ZTT data were nearly complete, though NSCAW contained missing data, particularly in reasons for removal. The companion article contains more information on missing
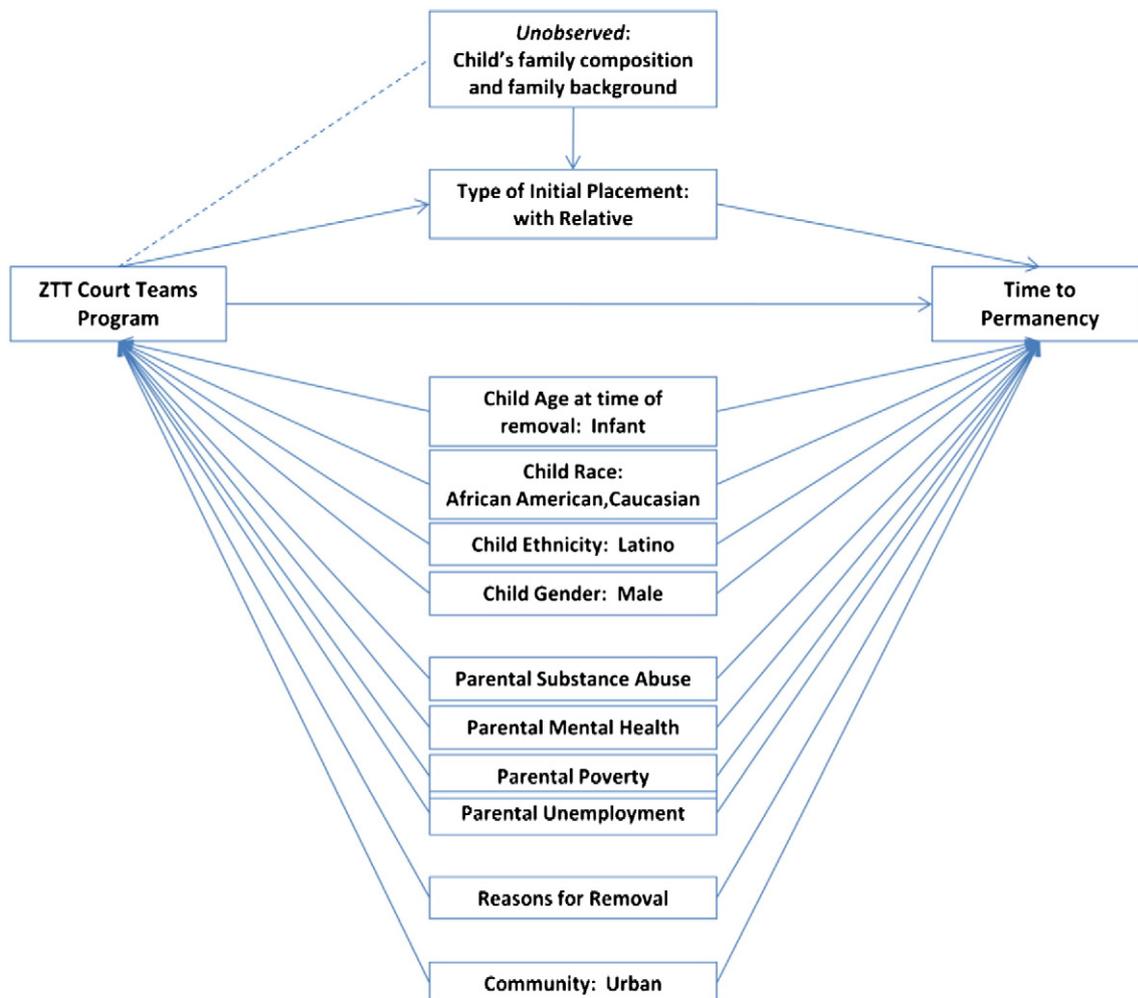

Fig. 1. Conceptual model and biasing effect of placement characteristics mediator.

data. Multiple imputation is widely regarded as an appropriate approach to missing data, using data for known variables to estimate likely answers for the missing data through several rounds of Monte Carlo simulations[3] (Little & Rubin, 2002). While statisticians have traditionally viewed five imputations as sufficient, more recently experts indicate that 20 imputations are optimal (StataCorp., 2009). Twenty rounds of multiple imputation were conducted in SAS using IVEware. All other statistical analyses were conducted in Stata 10. As NSCAW uses a sophisticated sampling design, the svyset command was utilized to account for psu's, strata, and sampling weights. ZTT sites were coded as a separate stratum and each ZTT site was assigned its own psu. ZTT cases were each given a sampling weight of 1 since they represent the universe of cases in these sites.

3.3.2. Propensity score analysis

To best understand the effect of the ZTT Court Teams program, ideally one would observe participant outcomes in the program and observe the same children when they did not experience the program. The latter is a counterfactual. The difference between these outcomes would reflect program impact since all other factors would be held constant. Of course, a child cannot simultaneously participate in the treatment and comparison groups. Instead, randomization is viewed as the best approach to equalize both observed and unobserved differences between the groups.

Rarely is randomization of individuals an option in child welfare research. Researchers therefore must rely on statistical methods to adjust for between-group differences. Regression is the most common method for adjusting between-group comparisons for other factors. Once these adjustments are made, the researcher then assumes that any unmeasured (or remaining) confounding can be ignored. According to Rubin, regression is satisfactory when the mean difference in likelihood of program participation between the groups is fairly small, the variance in these probabilities is nearly the same, and the variance in the residuals of the covariates is also very similar (Rubin, 2001). Researchers rarely compare their groups on these factors. Moreover, estimates from regression can be skewed if there are a fair number of cases that are not on the common support. That is, regression may do a poor job of estimating program effect in arguably the most important situations, those where the treated and comparison cases differ substantially. It extends the linear model based on known data to calculate an effect difference for those without a good match. The resulting estimate of the treatment effect can be quite sensitive to the functional form of the model (Foster, 2010).

A propensity score analysis can better identify issues involving the common support (Foster, 2010; Rosenbaum, 2010). The propensity score is the probability of the child being in "treatment" or in this case, participating in a program or intervention, given a particular set of covariates (Rosenbaum & Rubin, 1983). The challenge is selecting the covariates on which to predict program participation. Leaving out relevant covariates can produce bias as can including inappropriate ones. A directed acyclic graph (DAG) is a useful diagramming tool to identify key covariates (Foster, 2010; Pearl, 2009). Like regression, the end result with propensity score analysis is to assume that any differences between the treatment and comparison groups are

ignorable with careful covariate selection. Covariates used to predict the propensity score in this analysis were described earlier.

The propensity score can be used for matching cases in the two groups, analyzing subgroups with similar propensity scores such as by quartile, or forming probability weights. This analysis uses propensity scores as weights. Weighting acts as a highly refined form of matching (Morgan & Harding, 2006). The weights are calculated as one over the probability of the treatment status actually experienced. For ZTT cases, the weight is one over the propensity score; for the other cases, the weight is one over one minus the propensity score. As a result, ZTT or "treatment" cases with high propensity scores receive a very low weight since there are likely many cases like this, while comparison cases with high propensity scores receive a very high weight since they are underrepresented in the comparison group (Foster, 2010).

The key mechanical property of the propensity score is that it effectively summarizes the covariates; as a practical matter, what this means is that the distribution of the covariates should not differ between the ZTT and NSCAW groups once cases have been matched on the propensity score. In that case, the covariates are said to "balance". This property, however, is asymptotic, and so comparisons involving finite groups may still suffer from confounding, even involving the observed variables.

One can assess balance using between-group comparisons of the covariates used in calculating the propensity score. The expectation is that the between-group difference will be statistically significant not more than one could expect by chance. Consistent with the way in which we calculated the effect of the program on the outcomes, we calculated between-group levels of statistical significance using regression. This procedure is simply a mechanical way of calculating significance levels. So for dichotomous covariates, we assessed balance using bivariate logistic regression; for continuous covariates, we used ordinary regression.

Our initial assessment revealed some between-group differences in the covariates. Such differences indicate that the propensity-score equation does not completely capture the relationship between the covariates and program participation. For example, the propensity score equation may specify a linear relationship between a covariate and exposure yet the two may be related non-linearly. In that case, one can modify the analysis (i.e., improve balance) by adding interactions and non-linear terms to the propensity score model.

The final propensity score model used to predict participation in the ZTT Court Teams program is below:

$$CT_i = \beta_0 + \beta_1 [CC_i] + \beta_2 [PC_i] + \beta_3 \left[U_{ij} \right] + E_4 [RR_i] + \beta_5 \left[M_i^* Cov_i \right] + \beta_5 \left[PM_i^* Cov_i \right] + \beta_6 \left[U_{ij}^* Cov_i \right] + \varepsilon_i \qquad (1)$$

where CT represents participation in the ZTT Court Teams initiative. CC indicates the vector of child characteristics and PC is a similar vector of parent characteristics. U denotes the county's rank on the urban–rural continuum. RR signifies the reasons for removal. M*Cov represents a vector of interactions between male and each of the other covariates. PM*Cov symbolizes interactions between psychological maltreatment and 1) poverty, and 2) physical abuse. Lastly, U*Cov stands for interactions between the rural–urban continuum and each race/ethnicity variable. Measures for each of these covariates were presented in Section 3.2.2. Once balance was achieved, the p score weights were multiplied by the survey weights to generate a new weight used in the analysis.[4]

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[3] Multiple imputation generally is implemented under the missing at random assumption. That assumption means that those who do and do not leave the study differ in only observed ways. In other words, when matched on observed characteristics, those who do and do not leave are exchangeable: the latter provide a sound measure of the information the former would have provided had they participated in the interview. This assumption is the missing-data analog to ignorability, and like ignorability, its plausibility depends on the nature of the problem being studied and the choice of covariates.(Little & Rubin, 2002).

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[4] Balance was also tested with these new weights (propensity score weights multiplied by the sampling weights). Balance was evident with these weights as well.

3.3.3. Discrete-time hazard (DTH) analyses

One can analyze data involving a time to an event in several ways, but hazard modeling is best suited to such analyses. The main advantage to such a model is in how it incorporates censored cases. These are cases that are still in foster care at the end of the study. Clearly, dropping these cases would be inappropriate; such a "sampling" plan is clearly related to the processes being studied. Other options include treating these individuals as experiencing the event (leaving foster care) at the end of the observation period. These choices have a range of poor statistical properties.

Hazard models can be estimated in any of several ways, but one simple way involves reorganizing the data into discrete-time units (e.g., days). Each individual now has multiple records, one for each day through the point where the observation period ends or the individual exits foster care (i.e., experiences the event of interest). When the individual can experience only one type of event, estimation can be performed with a simple logistic regression model (Allison, 1982). The handling of the censored cases in this instance is clear— these individuals contribute one record for each day in foster care (in the risk pool) and no records beyond that. They have no record that indicates the event was experienced.

3.3.4. Competing risks analysis

Another advantage to the discrete-time hazard model is that it generalizes easily to situations where multiple exits are possible. The different types of exits are known as "competing risks". In this case, estimation involves multinomial logit: the different levels of the outcome are the different exits with no exit as the reference category. DTH is also very flexible, allowing for models that test if and how the hazard model varies over time (Allison, 1982).

The following model was used to test the ZTT Court Teams effect on duration in foster care by type of foster care exit using DTH with MNL:

$$\text{FC exit}_i = \beta_0 + \beta_1 CT_i + \beta_2 Wk_j \qquad (2)$$

FC exit signifies the type of exit from the child welfare system, CT refers to participation in the ZTT Court Teams program, and Wk represents week. The propensity score based weights (propensity score weight multiplied by the survey sampling weight) were applied in the analysis as probability weights. The covariates are captured in the propensity score weights and do not explicitly appear in the model. These weights effectively created a pseudo-population in which the treatment condition was not confounded by the covariates used to estimate the propensity score. Remaining in foster care served as the reference exit category for the MNL. Results indicate the conditional probability that those in the ZTT Court Teams program would experience each type of exit relative to continuing in foster care.

Model 2 is a linear approach, estimating a constant program effect over time. In reality, the program effect may vary with time. The following models were used to assess whether the effect of time was nonlinear.

$$\text{FC exit}_i = \beta_0 + \beta_1 CT_i + \beta_2 Wk_j + \beta_3 Wk_j^2 + \beta_4 Wk_j^3 \qquad (3)$$

$$\text{FC exit}_i = \beta_0 + \beta_1 CT_i + \beta_2 Q2_j + \beta_3 Q3_j + \beta_4 Q4_j + \beta_5 Q2_j^* CT_i + \beta_6 Q3_j^* CT_i + \beta_7 Q4_j^* CT_i \qquad (4)$$

Model 3 still estimates a constant program effect within an exponential model of time. In Model 4 the weeks elapsed since the child was removed from the home are divided into quartiles (Q) and the program effect is allowed to vary within each quartile. The propensity score based weights were applied to these models as well.

Since NSCAW included five waves of data collection, the comparison group generally had a longer follow up time period than the ZTT Court Teams cases. Hazard modeling can accommodate this feature of

Table 1
Experience of exits from the child welfare system.

Type of foster care exit	ZTT Court Teams (n = 298)		NSCAW sample[a] (n = 511)	
	pct	se	pct	se
Reunification	37.6%	(0.047)	29.3%	(0.042)
Adoption	15.4%	(0.059)	40.7%	(0.045)
Relative custodian	24.8%	(0.085)	8.4%	(0.033)
Non-relative guardian	3.0%	(0.017)	1.6%	(0.007)
Still in foster care at end of study period[b]	19.1%	(0.068)	20.1%	(0.036)

[a] Percentages calculated with sampling weights but not propensity score weights and reflect the results across all imputations. Standard errors based on first imputation only.
[b] Study periods are not identical across or within samples. The ZTT group includes all cases that entered from the time the project started in 2005 until the end of 2009. Cases entered the program throughout this time period. Follow up data on ZTT children are available through September 2010. The NSCAW sample includes all children in the survey who entered child welfare supervised out of home placement before the age of three. Most cases qualified during the first wave, though children first met the criteria throughout the five NSCAW waves. Data on NSCAW cases were censored at the point that the longest ZTT case is known to have taken to reach permanency.

the data. NSCAW cases were censored at the longest known point of time to permanency for ZTT cases. This served to equalize the follow up timeframes to some degree. Under this approach, the NSCAW cases running past the censoring point (53 months or about 4.5 years) were coded as not yet having reached permanency as of that time. Data past this point were excluded from the analyses.[5]

4. Results

4.1. Descriptive analysis

As one would expect given the different sampling frames, the ZTT Court Teams sample differs to some degree from the children in the NSCAW comparison group.[6] Two-thirds (67%) of the ZTT children were infants at the time they were removed from the home, compared to 57% of the NSCAW sample. African Americans were the largest racial group among the ZTT children (37% ZTT v. 24% NSCAW) while Caucasians were the predominant category in the comparison group (29% ZTT v. 41% NSCAW). Differences were also pronounced in terms of parent characteristics. The ZTT Court Teams group was more likely to experience substance abuse (72% ZTT v. 59% NSCAW) and general poverty (95% ZTT v. 81% NSCAW). The NSCAW comparison group reported higher need for employment services (35% ZTT v. 47% NSCAW) and severe mental health issues (17% ZTT v. 21% NSCAW). Both samples had high rates of reported neglect (69% ZTT v. 72% NSCAW). The NSCAW group experienced higher rates of other reasons for removal such as abandonment, psychological maltreatment, and sexual abuse. (See the first companion paper for more description of study participants.)

The ZTT and NSCAW groups also differed markedly in how the children exited the foster care system (Table 1). Reunification was the most common exit for the ZTT children (38% ZTT vs. 29% NSCAW), while the majority of NSCAW children exited through adoption (15% ZTT vs. 41% NSCAW). The groups also differed greatly in the proportion exiting to relative custody, with the ZTT Court Teams children experiencing this

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[5] The data provide enough information to identify the shape of the baseline hazard beyond this point, but the effect of the treatment would be completely determined by data observed before that point. This issue highlights one reason for using a discrete-time hazard. It models the baseline hazard non-parametrically. A parametric model might involve misspecification that would spillover onto estimation of the effect of the court teams.

[6] NSCAW sampling weights only were used to calculate frequencies. Frequencies do not reflect propensity score weights. Note that summary statistics are calculated using the Kaplan-Meier method to address issues of censoring. Stata 10 does not allow the use of survey weights in this approach. Traditional medians were also calculated with survey weights, but not adjusted for censoring. Trends in results are similar to those from the Kaplan Meier method. See Table 2 for comparisons.

Table 2
Length of time (in days) to foster care exits: Summary across the imputations (n = 809).

Type of exit from foster care		ZTT[a]	NSCAW imputations[b]				
			Low	25th percentile	50th percentile	75th percentile	High
Reunification	Median (se)	309 (17.6)	547 (26.9)	581 (25.3)	583 (24.5)	596 (35.5)	635 (34.8)
	Mean (se)	340 (17.9)	587 (30.5)	638 (30.6)	649 (29.7)	670 (32.5)	699 (32.7)
Adoption	Median (se)	464 (16.4)	764 (38.6)	777 (33.7)	798 (32.2)	812 (32.2)	818 (31.5)
	Mean (se)	496 (33.5)	800 (22.2)	824 (22.3)	829 (21.5)	835 (21.5)	846 (22.0)
Relative custodian	Median (se)	351 (13.9)	450 (66.5)	471 (29.3)	541 (61.8)	598 (114.3)	747 (43.7)
	Mean (se)	363 (13.7)	487 (57.1)	565 (60.3)	636 (58.1)	666 (71.3)	822 (69.4)
Non-relative guardian	Median (se)	481 (146)	878 (120.6)	958 (40.2)	1010 (78.0)	1030 (107.3)	1200 (317.3)
	Mean (se)	467 (33.3)	780 (126.5)	983 (105.3)	1059 (117.3)	1075 (75.1)	1185 (95.0)

[a] No imputations were needed for ZTT Court Teams outcome data.
[b] Summary statistics computed using Kaplan–Meier method to incorporate censoring which does not allow the use of survey weights. The traditional median calculated with survey weights but not allowing for censoring yields a similar range of medians across the NSCAW imputations: reunification (494 days to 681 days), adoption (764 days to 783 days), relative custodian (494 days to 792 days), and non-relative guardian (878 days to 1240 days).

nearly three times as often as the comparison sample (25% ZTT vs. 8% NSCAW). Few in either group exited to non-relative guardianship, though ZTT cases were about twice as likely to do so.

ZTT Court Teams children experienced significantly shorter time in the child welfare system than the NSCAW group across all types of exits. Table 2 displays summary statistics for the ZTT group and the NSCAW imputations. Quartiles across the imputations are shown to illustrate that these data are estimated. Using just one imputation would underestimate the overall uncertainty in the model by treating these estimates as a piece of real data. The ZTT means are significantly shorter than the NSCAW comparison group for all types of exits from foster care across 95% or more of the imputations. These are statistically significant at the 0.05 level. In addition, ZTT medians for time to reunification and adoption are both significantly shorter than the medians for all NSCAW imputations (p<0.05). Median time to relative custodianship is significantly shorter for ZTT children compared to 75% of the NSCAW imputations (p<0.05). Time to exit for non-relative guardianship is significant for ZTT compared to only 40% of the NSCAW imputations, perhaps partially explained by the small sample size (n = 18).

Children in the ZTT Court Teams program exited to reunification after median of 309 days (CI 280, 342) or about 10 months, compared to a lower bound average of 547 days (CI 501, 589) or about 18 months for the NSCAW children. These figures indicate that of children who were reunified, ZTT cases exited foster care typically 8 months sooner (as a lower bound across the imputations) than the NSCAW comparison group.[7] Similarly, ZTT cases typically exited at least 10 months faster among those who were adopted, a minimum of 3 months sooner for children who exited to relative custodianship, and at least 13 months faster on average for those who exited to non-relative guardianship.

4.2. Competing risks analysis

The log rank test was conducted to determine the need for a competing risks analysis. Significant χ^2 results for all cases across the imputations indicate different survival functions for each type of exit from foster care (range p = 0.000 to p = 0.027 across the imputations). Similar findings resulted when tested just among the ZTT treatment cases (p = 0.000) and solely for the comparison group (range p = 0.000 to 0.029 across the imputations). Therefore, a competing risks analysis to consider the ZTT program effect within each type of exit was warranted (Akin, 2011).

Table 3 shows results from the discrete-time hazards model with multinomial logistic regression. The coefficients for each type of exit

represent the effect of the covariate on the timing of that exit relative to remaining in foster care. Compared to NSCAW cases, children in the ZTT Court Teams program are significantly more likely to experience reunification, relative custodianship, or non-relative guardianship rather than remaining in foster care over time. As described previously, reunification was the most common type of exit for ZTT children. Results for the main DTH model find that ZTT children experienced an increased "risk" of 2.31 (relative to NSCAW) of reunification rather than remaining in foster care over the course of the study period (p<0.05). Similarly, ZTT cases had a greater risk than NSCAW children of exiting foster care for relative custodianship (RRR = 7.66, p<0.05) and for non-relative guardianship (RRR = 8.42, p<0.01) compared to remaining in foster care over time. While a greater proportion of NSCAW children experience adoption than do those in ZTT, the relative risk of exiting to adoption (compared to staying in foster care) did not differ by treatment group.

4.3. Sensitivity analysis

The main model makes the proportional hazards assumption—that the effect of the treatment (in proportional terms) does not vary with duration—that is, the effect of the court teams program does not grow or shrink as children linger in foster care. Two models were run to assess the influence of this assumption (Table 3). When time is treated exponentially and the program effect remains constant over time (model 3), the program effect increases to some extent for each type of exit from foster care. ZTT children have an increased risk of exiting foster care for all reasons compared to NSCAW children in this model, although adoption is not statistically significant. Therefore, the significant program effects in the main model are robust when time is handled exponentially. The main model may actually underestimate program results somewhat.

The final model (model 4) allows the program effect to vary across time. This model suggests the differential program effect within each time quartile of duration changes for each type of exit (relative to the first quartile, representing about 6 months since the child was removed from the home). Results indicate the constant program effect decreases for all but adoption. None of the constant program effects are significant at this point. One explanation is power: since more assumptions are relaxed with each model, less information is available to calculate the estimates, and standard errors increase. The program effects are now largely captured in the interactions between ZTT participation and the time periods. By the last quartile, the program effect drops off for each type of foster care exit. However, the change in program effect over time is rarely statistically significant compared to the first quartile. A separate series of Wald tests were conducted to assess whether the set of ZTT program interactions with each quartile was equal to zero for each type of foster care exit. Insignificant results for reunification (F = 0.22, p = 0.882), adoption (F = 1.16, p = 0.328), and relative custodianship (F = 0.38, p = 0.766) indicate that statistically significant

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[7] Based on comparing the ZTT median to the NSCAW median of the imputation with the lowest median number of days in foster care for those who were reunified. Comparing ZTT to the highest imputation yields an upper bound of ZTT children exiting to reunification nearly 11 months sooner.

Table 3
Multinomial logit discrete time hazard models with propensity score weights: types of exits from foster care (n = 809).

Type of foster care exit	Covariate	Main DTH model			Sensitivity analyses					
		Model 2			Model 3			Model 4		
		RRR	se	p	RRR	se	p	RRR	se	p
Remaining in foster care (reference)										
Reunification	ZTT Court Teams	2.31	0.896	0.035	2.72	1.30	0.041	1.83	1.69	0.516
	Week	1.01	0.003	0.043	1.07	0.034	0.041			
	Week^2				1.00	0.000	0.177			
	Week^3				1.00	0.000	0.370			
	Week Q2 (quartile 2)							3.20	2.43	0.131
	Week Q3 (quartile 3)							7.14	5.34	0.010
	Week Q4 (quartile 4)							8.75	5.85	0.002
	Week Q2*ZTT							1.91	1.72	0.472
	Week Q3*ZTT							1.12	1.25	0.918
	Week Q4*ZTT							0.750	0.665	0.746
Adoption	ZTT Court Teams	0.929	0.474	0.886	1.13	0.685	0.841	2.76	3.63	0.443
	Week	1.01	0.002	0.000	1.10	0.031	0.002			
	Week^2				0.999	0.000	0.006			
	Week^3				1.00	0.000	0.018			
	Week Q2 (quartile 2)							67.8	66.4	0.000
	Week Q3 (quartile 3)							120	82.3	0.000
	Week Q4 (quartile 4)							227	151	0.000
	Week Q2*ZTT							0.175	0.282	0.283
	Week Q3*ZTT							0.660	0.847	0.747
	Week Q4*ZTT							0.530	0.632	0.596
Relative	ZTT Court Teams	7.66	6.27	0.016	9.77	9.69	0.025	2.66	3.51	0.461
	Week	1.01	0.006	0.374	1.06	0.112	0.616			
	Week^2				1.00	0.001	0.910			
	Week^3				1.00	0.000	0.898			
	Week Q2 (quartile 2)							9.24	11.3	0.073
	Week Q3 (quartile 3)							6.67	7.22	0.084
	Week Q4 (quartile 4)							12.17	14.85	0.044
	Week Q2*ZTT							1.50	0.1.94	0.754
	Week Q3*ZTT							7.54	9.01	0.096
	Week Q4*ZTT							0.382	0.479	0.445
Guardian	ZTT Court Teams	8.42	6.21	0.007	12.5	10.7	0.006	1.00	0.512	0.998
	Week	1.02	0.007	0.002	0.979	0.206	0.919			
	Week^2				1.00	0.002	0.643			
	Week^3				1.00	0.000	0.537			
	Week Q2 (quartile 2)							1.01	.	.
	Week Q3 (quartile 3)							8.5e+10	1.2e+11	0.000
	Week Q4 (quartile 4)							1.2e+12	1.1e+12	0.000
	Week Q2*ZTT							2.2e+11	.	.
	Week Q3*ZTT							39.8	44.4	0.001
	Week Q4*ZTT							1.87	.	.

variation in program effect does not occur over time.[8] Based on these results, we fail to reject the proportional hazards assumption. Therefore, the main model is sufficient without allowing the program effect to vary over time.

4.4. Site differences

Exit patterns differ markedly across the ZTT Court Teams sites. Table 4 illustrates experience of each type of exit from foster care within each program location. Clearly, site 1 pursues reunification much more frequently than the other sites which more closely resemble the NSCAW comparison group on this outcome. Site 2 strives for adoption to a greater extent than the other projects. Site 3 uses more non-relative guardianship than other sites, but more children here are likely still to be in foster care as well. Site 4 equally emphasizes relative custodianship and reunification. Trends in relative risks (not shown) mirror the percentages reporting each type of exit in Table 4. Note that a site level analysis is quite limited by the small number of children who experience each type of exit within a site.

5. Discussion

Children in the ZTT Court Teams program exit the child welfare system significantly faster than similar children in the National Survey of Child and Adolescent Well-Being (McCombs-Thornton, 2011a). This analysis suggests that ZTT children are less likely to exit child welfare through adoption, and more likely to experience reunification, placement with a relative custodian, or non-relative guardianship than the NSCAW sample. Prior research finds that adoption requires much more time than other forms of permanency. This difference in how children exit the foster care system may explain much of the difference in

Table 4
Experience of exits from foster care across ZTT Court Teams sites.

Type of exit	Site 1 (n = 71)	Site 2 (n = 28)	Site 3 (n = 77)	Site 4 (n = 122)	NSCAW (n = 511)
Reunification	52.1%	32.1%	31.2%	34.4%	29.3%
Adoption	9.9%	57.1%	16.9%	8.2%	40.7%
Relative custodian	32.4%	3.6%	6.5%	36.9%	8.4%
Non-relative guardian	0%	0%	7.8%	2.5%	1.6%
Still in foster care 10/1/2010[a]	5.6%	7.2%	37.7%	18.0%	20.1%

[a] Still in foster care at end of study period for NSCAW.

time to permanency between the ZTT Court Teams cases and the comparison group.

However, these analyses reveal that even for those children exiting the same way, ZTT children reach permanency sooner. A discrete-time hazards analysis was used with a multinomial logit and propensity score weights to assess the competing risks of the types of exits from foster care relative to remaining in foster care. In this analysis, the program effect was significant for reunification, relative custodianship, and non-relative legal guardianship. At any point in time, the ZTT children had a significantly greater risk of exiting the system to one of these types of exits rather than continuing in foster care. This finding implies they exited the system faster than the NSCAW comparison group for these types of exits. The competing risk analysis found that the risk of adoption among ZTT children was not significantly different from that of the NSCAW comparison group. The differences in the distribution of types of foster care exits between the ZTT and NSCAW groups explains some of the overall program effect in time to permanency. ZTT children clearly exited significantly faster for three of the four types of exits.

Reunification warrants special consideration in this discussion. The ZTT Court Teams program purposely does not frame itself as a "reunification" program. This goal is somewhat unusual compared to other child welfare related efforts such as the Family Reunification Program or drug court that often do focus on reunification. ZTT considers a shorter time to permanency to be in the child's best interest, generally regardless of how permanency is achieved. Given this, it is somewhat ironic that reunification was the most common means of exiting the child welfare system among ZTT Court Teams children (38%).

The overall findings here are promising, but require some consideration. First, the propensity score analysis helps to address issues of causal inference, but it is not a foolproof method. The propensity score reflects probability of program participation given a particular set of covariates. The extensive list of covariates used to generate the propensity scores were selected based on findings from the literature as well as a review of descriptive statistics suggesting characteristics on which the ZTT Court Teams cases and the NSCAW sample appeared to differ. These variables were put into a conceptual model to help identify unobserved confounding. Since they all influence both program participation and the outcome variable (exiting from the child welfare system) they are true confounders and indeed should be in the model. There may be another variable, however, that would be appropriate for predicting program participation that was not used such as state child welfare laws or judicial willingness to participate in the ZTT Court Teams program. Inclusion of other variables was limited to what was available and measured fairly consistently in both the ZTT Court Teams MIS and NSCAW. However, the program effect on different types of exits relative to remaining in foster care (see Table 3) was so large that it is unlikely that including a key omitted variable would negate or even reverse the program effect.

Another limitation is that this paper only considers the child's first episode in the child welfare system. Some children experience additional maltreatment and re-enter foster care. How the program may affect these rates of re-entering the system is unclear.

Moreover, each site operates in a different context as described elsewhere (Hafford & DeSantis, 2009; McCombs-Thornton, 2011b). ZTT Court Teams sites differ in the proportion of children who experience each type of foster care exit. Exploring these site differences is limited by the small sample sizes across the sites. As more children enter the program over time, it would be insightful to further consider the contribution of each site to the overall program effect within each type of foster care exit. A formal fidelity to the model assessment is beyond the scope of this analysis, but would be a valuable next step.

Just as children exit the child welfare system in various ways, they may also experience different long term outcomes depending on their type of exit. This study treats each type of exit equally, without favoring one type of exit over another. Future evaluations should further explore the separate longer term effects of reunification, adoption, relative custodianship, and non-relative guardianship on a host of child outcomes including re-entry into the child welfare system as well as behavior, health, and overall child wellbeing. Findings could ultimately inform program design for the ZTT Court Teams initiative as well as other family-oriented child maltreatment interventions.

References

Ackerson, B. (2003). Parents with serious and persistent mental illness: Issues in assessment and services. *Social Work*, *48*, 187–195.
Akin, B. A. (2011). Predictors of foster care exits to permanency: A competing risks analysis of reunification, guardianship, and permanency. *Children and Youth Services Review*, *33*, 999–1011.
Allison, P. (1982). Discrete-time methods for the analysis of event histories. *Sociological Methodology*, *13*, 61–98.
American Bar Association (1997). Congress passes adoption/foster care reform law. [WWW page]. http://www.abanet.org/child/adopt-reform.pdf
Barth, R. (1997). Effects of age and race on the odds of adoption versus remaining in long-term out-of-home care. *Child Welfare: Journal of Policy, Practice and Program*, *76*, 285–308.
Barth, R., Wulczyn, F., & Crea, T. (2004). From anticipation to evidence: Research on the Adoption and Safe Families Act. *Virginia Journal of Social Policy & the Law*, *12*, 371–399.
Becker, M., Jordan, N., & Larsen, R. (2007). Predictors of successful permanency planning and length of stay in foster care: The role of race, diagnosis and place of residence. *Children and Youth Services Review*, *29*, 1102–1113.
Connell, C., Katz, K., Saunders, L., & Tebes, J. (2006). Leaving foster care—The influence of child and case characteristics on foster care exit rates. *Children and Youth Services Review*, *28*, 780–798.
Courtney, M. (1994). Factors associated with the reunification of foster children with their families. *The Social Service Review*, *68*, 81–108.
Courtney, M., & Wong, Y. (1996). Comparing the timing of exits from substitute care. *Children and Youth Services Review*, *18*, 307–334.
Dowd, K., Kinsey, S., Wheeless, S., & Thissen, R. (2008). *National Survey of Child and Adolescent Well-Being (NSCAW), combined waves 1–5, Data file user's manual, restricted release version.* Research Triangle Park, NC: Research Triangle Institute.
Foster, E. M. (2010). Causal inference and developmental psychology. *Developmental Psychology*, *46*, 1454–1480.
General Accounting Office (2002). Foster care: Recent legislation helps states focus on finding permanent homes for children, but long-standing barriers remain. [report]. http://www.gao.gov/new.items/d02585.pdf
Hafford, C., & DeSantis, D. (2009). *Evaluation of the court teams for maltreated infants and toddlers project: Final report. Office of Justice Grant No. 2006-MU-MU-0065.* Arlington, VA: James Bell Associates.
Little, R., & Rubin, D. (2002). *Statistical analysis with missing data.* Hoboken, NJ: Wiley-Interscience.
Lyons, T. (2001). When reasonable efforts hurt victims of abuse: Five years of the Adoption and Safe Families Act of 1997. *Seton Hall Legislative Journal*, *26*, 391–413.
McCombs-Thornton, K. (2011a). The effect of the Zero to Three Court Teams initiative on time to permanency — A propensity score time-to-event analysis. *Fostering a permanent home: A mixed methods evaluation of the ZERO TO THREE court teams for maltreated infants and toddlers initiative. Doctoral dissertation.* Chapel Hill, NC: University of North Carolina at Chapel Hill.
McCombs-Thornton, K. (2011b). An exploration of how the Zero to Three Court Teams initiative works to reduce time to permanency — A unique case qualitative analysis. *Fostering a permanent home: A mixed methods evaluation of the ZERO TO THREE court teams for maltreated infants and toddlers initiative. Doctoral dissertation.* Chapel Hill, NC: University of North Carolina at Chapel Hill.
McDonald, T. P., Poertner, J., & Jennings, M. A. (2007). Permanency for children in foster care: A competing risks analysis. *Journal of Social Service Research*, *33*(4), 45–56.
Morgan, S. L., & Harding, D. J. (2006). Matching estimators of causal effects: Prospects and pitfalls in theory and practice. *Sociological Methods Research*, *35*, 3–60.
Mullick, M., Miller, L., & Jacobsen, T. (2001). Insight into mental illness and child maltreatment risk among mothers with major psychiatric disorders. *Psychiatric Services*, *52*, 488–492.
Pearl, J. (2009). Remarks on the method of propensity score. *Statistics in Medicine*, *28*, 1415–1424.
Rosenbaum, P. (2010). *Design of observational studies.* New York: Springer.
Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, *70*, 41.
Rosenberg, S. A., & Robinson, C. C. (2004). Out-of-home placement for young children with developmental and medical conditions. *Children and Youth Services Review*, *26*, 711–723.
Rubin, D. B. (2001). Using propensity scores to help design observational studies: Application to the tobacco litigation. *Health Services and Outcomes Research Methodology*, *2*, 169–188.

Shrier, I., & Platt, R. W. (2008). Reducing bias through directed acyclic graphs. *BMC Medical Research Methodology*, *8*, 70.

Snowden, J., Leon, S., & Sieracki, J. (2008). Predictors of children in foster care being adopted: A classification tree analysis. *Children and Youth Services Review*, *30*, 1318–1327.

StataCorp. (2009). *Stata multiple imputation reference manual release 11*. College Station, TX: StataCorp LP.

U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau (2010). The AFCARS report: Preliminary estimates for FY 2009 as of July 2010 (17). [report]. http://www.acf.hhs.gov/programs/cb/stats_research/afcars/tar/report17.htm

U.S. Department of Health and Human Services, Administration for Children and Families, Children's Bureau (2009). Trends in foster care and adoption—FY 2002–FY 2008. [report]. http://www.acf.hhs.gov/programs/cb/stats_research/afcars/trends.htm

U.S. Department of Health and Human Services, Administration on Children, Youth and Families, Children's Bureau. (n.d.). Child welfare outcomes 2002–2005: Report to Congress prepared by the Children's Bureau (ACYF, ACF) of the U.S. Department of Health and Human Services [report]. http://www.acf.hhs.gov/programs/cb/pubs/cwo05/index.htm

US Department of Health and Human Services, Administration on Children, Youth and Families, Children's Bureau (2006). Adoptions of children with public child welfare agency involvement by state FY 1995–FY 2004. [report]. http://www.acf.hhs.gov/programs/cb/stats_research/afcars/adoptchild03b.htm

US Department of Health and Human Services, Administration on Children, Youth and Families, Office of Planning, Research, and Evaluation (2009). National Survey of Child and Adolescent Well-Being (NSCAW) overview. [WWW page]. http://www.acf.hhs.gov/programs/opre/abuse_neglect/nscaw/nscaw_overview.html#overview

Winokur, M., Holtan, A., & Valentine, D. (2009). Kinship care for the safety, permanency, and well-being of children removed. *Campbell Systematic Reviews*, *1*, 1–171.

Wulczyn, F. (2003). Closing the gap: Are changing exit patterns reducing the time African American children spend in foster care relative to Caucasian children? *Children and Youth Services Review*, *25*, 431–462.

Wulczyn, F. H., Chen, L., & Hislop, K. B. (2006). Adoption dynamics and the Adoption and Safe Families Act. *The Social Service Review*, *80*, 584–608.