Child Welfare Agency Performance: How Are Child, Agency, And County Factors Related To Achieving Timely Permanency Outcomes For Children In Foster Care?

Elizabeth Caplick Weigensberg

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctorate of Philosophy in the Department of Social Work.

Chapel Hill

2009

Approved by

Charles L. Usher, PhD

Shenyang Guo, PhD

Dean F. Duncan, PhD

Gary M. Nelson, DSW

Richard P. Barth, PhD

© 2009
Elizabeth Caplick Weigensberg
ALL RIGHTS RESERVED

Abstract

Elizabeth Caplick Weigensberg

Child welfare agency performance: How are child, agency, and county factors related to achieving timely permanency outcomes for children in foster care?

(Under the direction of Charles L. Usher, PhD)

Performance measurement and accountability have become increasingly important for state and local child welfare agencies, motivating a great need for understanding what factors are related to achievement of performance outcomes. This study evaluated how child characteristics, local child welfare agency factors, and county demographics are related to achievement of timely permanency outcomes.

This study used longitudinal administrative data of 22,316 children who entered foster care for the first time in North Carolina between 2002 and 2005, along with readily available local agency and county data. A multi-level survival approach was used to assess individual and contextual factors related to timely achievement of several permanency outcomes, specifically reunification, adoption, guardianship or custody, and emancipation. Furthermore, a competing risks analytical framework was used to simultaneously assess how child, agency, and county factors relate to achievement of different permanency outcomes, which was stratified by age, to identify differences in these relationships among infants, children ages 2 through 12, and adolescents.

Study results demonstrated that multiple child, agency, and county factors were related to how quickly children in foster care achieved permanency outcomes, yet the strength and direction of these relationships differed by age and type of permanency. In

particular, the child characteristics of age, gender, race, ethnicity, and reason for placement into foster care were all shown to have significant relationships with timely achievement of permanency. Local child welfare agency characteristics, specifically caseload size, use of relative placements, agency engagement in alternative response, and agency history of implementing reform efforts, as well as county demographics of poverty and unemployment were significantly related to timely achievement of several permanency outcomes.

These findings provide insight into how individual- and macro-level contextual factors play a role when measuring agency performance. This research also provides a needed evidence base to identify specific factors that may be useful for estimating stratified performance measures, allowing agencies to assess performance of particular subpopulations of children in foster care. Ultimately knowing how individual, agency, and county factors are related to permanency can help child welfare agencies better understand their own performance and help target limited resources for improvement efforts.

Acknowledgements

There are numerous people I would like to acknowledge and extend my sincerest gratitude for helping to make this dissertation possible. In particular, I am truly thankful for the outstanding support and guidance from the members of my dissertation committee, specifically Drs. Lynn Usher, Rick Barth, Shenyang Guo, Dean Duncan, and Gary Nelson. I cannot express how grateful I am for having the opportunity to work with and learn from such an exceptional group of researchers and scholars, who have mentored me throughout my doctoral journey. The knowledge and experiences I have gained from them has helped to reinforce and shape my dedication to pursing rigorous research and evaluation for improving the lives of children and families as well as the organizations and professionals that serve them.

Furthermore, I want to extend my greatest appreciation to the countless teachers, colleagues, and friends over the years, who have helped me to reach this achievement. In particular, I want to acknowledge my appreciation for the assistance of my UNC colleague Eleanor Locklin Brown, who provided valuable insight from her prior research. Furthermore, I want to thank the many dedicated professionals at the North Carolina Division of Social Services for sharing and valuing data as an important way to evaluate and improve child welfare practice.

Lastly, but most importantly, I want to acknowledge my heartfelt thanks to my family, whose love and support has helped me more than I could ever say. I would like to especially thank my husband Steven for all his love, patience, and support which motivate me to be a

better person every day, as well as my mother who always taught me to value education and to never give up despite life's many challenges.

Table of Contents

Page

List of Tables …… ix

List of Figures …….. x

Chapter 1: Introduction and Background ……..…… 1

Introduction ……..…… 1

Statement of Problem ……..……. 2

Background of Problem …….…….. 4

Theoretical and Conceptual Foundation …….……. 13

Review of Literature …….…..... 15

Research Aims …….……. 23

Conceptual Framework …….……24

Significance of Study ……... 25

Chapter 2: Research Questions and Methods …….…….. 27

Research Question …….……... 27

Research Hypotheses ...…….…… 27

Study Sample and Time Frame …….……28

Study Data …… 28

Measures…….……... 33

Data Analysis Procedures …….…… 42

Chapter 3: Descriptive and Preliminary Analysis and Evaluation of Local Variability ….. 53

Descriptive Analysis ……..…… 53

Preliminary Analysis …… 56

Local Variability in Achieving Timely Permanency ..…….. 60

Overview of Findings …….. 71

Chapter 4: Multilevel Analysis of Time to Achieve Permanency ……... 77

Time to Reunification …….. 77

Time to Adoption …… 81

Time to Guardianship or Custody …… 86

Comparing Naïve versus Corrective Cox Models …… 90

Overview of Findings ……... 93

Chapter 5: Assessing Competing Risks of Time to Achieve Permanency by Age …….. 98

Evaluating Presence of Competing Risks ……98

Competing Risks: Ages 0 to 1 …….. 103

Competing Risks: Ages 2-12 …… 106

Competing Risks: Ages 13 and Older ……...109

Overview of Findings ……... 112

Chapter 6: Conclusion and Implications …….……..117

Conclusion …… 117

Implications …….. 129

Limitations of Study ……. 138

Directions for Future Research ……140

Appendix ……...143

References ……164

List of Tables

Page

Table I: Sample characteristics …… 143

Table II: Median length of time (in days) in foster care to achieve permanency outcome by exit type ……. 145

Table III: Corrective-Cox models for time to reunification ……..….. 150

Table IV: Corrective-Cox models for time to adoption ……..……. 151

Table V: Corrective-Cox models for time to guardianship/custody …… 152

Table VI: Comparison of corrective-Cox models with naïve Cox models for time to reunification, adoption, and guardianship/custody ……. 153

Table VII: Competing risks LWA analysis for achieving permanency outcomes for children ages 0 to 1 ……. 155

Table VIII: Competing risks LWA analysis for achieving permanency outcomes for children ages 2 to 12 ……156

Table IX: Competing risks LWA analysis for achieving permanency outcomes for children ages 13 and older …….. 157

Table X: Summary of results: Hazard ratios and significance for all covariates for all models …….……... 158

Table XI: Summary of results: Direction and significance levels for significant results …. 161

List of Figures

Page

Figure I: Conceptual model of evaluating county, agency, and child characteristics in relation to achieving timely permanency outcomes …… 25

Figure II: Survivor curve for length of time in foster care (in days) to achieve permanency ……..59

Figure III: The interaction of child age and availability of family courts on hazard rate for reunification …… 81

Figure IV: The interaction of child age and agency use of relative placement on hazard rate for adoption ……..……. 84

Figure V: The interaction of child race and agency availability of family courts on hazard rate for adoption ……..……. 85

Figure VI: The interaction of child age and agency caseload size on hazard rate for guardianship/custody ……..… 88

Figure VII: The interaction of child age and agency use of non-family placement on hazard rate for guardianship/custody ……..…. 89

Figure VIII: The interaction of child age and agency engagement in alternative response on hazard rate for guardianship/custody ……90

Figure IX: Survivor curves for children ages 0-1 for each type of permanency …..…..... 100

Figure X: Survivor curves for children ages 2-12 for each type of permanency ……..101

Figure XI: Survivor curves for children ages 13 and older for each type of permanency …102

Chapter 1: Introduction and Background

Introduction

Performance measurement and accountability have reached increasing importance and national attention with the implementation of the federal Child and Family Services Reviews (CFSR). Research has demonstrated, however, that the use of biased cross-sectional data and measures can lead to questions regarding the validity and reliability of federal measures (Courtney, Needell, & Wulczyn, 2003; Orlebeke, Wulczyn, & Mitchell-Herzfeld, 2005; U.S. Government Accountability Office, 2004; Usher, Randolph, & Gogan, 1999; Usher, Wildfire, & Gibbs, 1999; Wulczyn, 1996; Wulczyn, Kogan, & Dilts, 2001). Therefore, states and local child welfare agencies have a great need for accurate and informative performance measures that utilize data and measures which represent the achievement of outcomes of all children in care. While there are several efforts using alternative longitudinal performance measures (Duncan, Kum, Flair, Stewart, & Weigensberg, 2008; Needell et al., 2008; Wulczyn, Chen, & Hislop, 2007), more research is needed to understand what individual- and macro-level factors are related to achievement of performance outcomes. Identifying what child, county, and agency factors influence performance measures requires the use of longitudinal data with the appropriate analytical methods to account for the nested nature of children grouped within county child welfare agencies, yet existing research has not explored this relationship using multi-level methods. Evaluating which individual- and macro-level factors are related to achievement of outcomes provides a needed evidence base to further assess and advance child welfare agency performance measures.

Statement of Problem

Every year in the United States, more than 3 million children are investigated for child maltreatment and nearly 900,000 of them are found to be victims of abuse or neglect (U.S. Department of Health and Human Services, Administration on Children, Youth and Families, 2007). Consequently, at any given point in time, more than half a million children are living in foster care in the U.S. (U.S. Department of Health and Human Services, Administration on Children, Youth and Families, 2006). With so many of the most vulnerable children involved with the child welfare system, it is imperative that child welfare agencies are held accountable to perform at the highest standards. In assessing agency performance, it is essential to use measures that accurately represent children's experiences in foster care and contribute to an understanding of how agencies can improve performance.

The increasing emphasis on accountability for state child welfare agencies is demonstrated by the implementation of the federal CFSR process and the growing interest of states to undertake their own efforts for evaluating their performance. Although the CFSR laid the foundation for holding state agencies responsible for achieving outcomes for children, many concerns plague the validity and reliability of the measures, leading states to seek alternative more accurate means of measuring performance. The validity of performance measures is essential since they are used to identify areas needing improvement, causing financial and staff resources to be committed to address these areas. Given the importance of valid performance measures and their desire to achieve positive outcomes for children in the child welfare system, many states have engaged in efforts to collect longitudinal data capturing the experiences of all children in care, allowing a more accurate assessment of

performance over time (Duncan et al., 2008; Needell et al., 2008; Wulczyn, Chen, & Hislop, 2007).

Because statewide levels of performance are based on the aggregate performance of county child welfare agencies, local variation may undermine the ability of states to achieve their goals. Numerous factors may contribute to variability among local agencies, including the characteristics of the children in care, the county they are serving, and the policies and practices within the agency. Generating performance measures stratified by categories of significant factors can help identify differences in performance, although with excessive numbers of factors for comparison, research is needed to prioritize and identify the most meaningful and useful factors for analysis. Research evaluating the relationships between child, county, and agency characteristics and achieving performance measures can provide an evidence base to inform the selection of the most important factors to assess performance.

When analyzing the relationships of factors contributing to local variation on achieving statewide performance measures, several methodological considerations need to be addressed. Because the use of longitudinal data is essential for capturing the experiences of all children throughout their time in the child welfare system, survival analysis is needed to estimate timely achievement of outcomes. Furthermore, given the nested nature of children served within county child welfare agencies, any analysis of relationships using child-level information should account for the nested nature of the data and control for autocorrelation, yet this is rarely done in existing child welfare research. Therefore, research is needed that combines the evaluation of multi-level factors using survival models to evaluate explicitly the relationship of child, county, and agency factors in regard to achieving timely child welfare outcomes.

The fundamental problem is that although strong emphasis is placed on performance measures and accountability of child welfare agencies, there is limited research available that tries to evaluate and advance child welfare performance measures. Research is urgently needed that utilizes longitudinal data and applies appropriate analytical methods to assess how individual and local factors are related to achievement of performance outcomes. State and local child welfare agencies need this research as an evidence base to select factors in which to generate stratified, focused performance measures, allowing them to more easily identify differences in achievement of outcomes and target needed improvement efforts.

Background of Problem

Accountability of Child Welfare Agencies

Since the l990s, the U.S. Congress and Department of Health and Human Services (HHS) have taken steps to revise the federal oversight process used to hold State child welfare agencies accountable for children involved in the system. The Adoption and Safe Families Act of 1997 (ASFA) established the mandate that child welfare agencies are responsible for the outcomes of safety, permanency, and well-being of children who come to the attention of child welfare agencies. Consequently, the focus of performance reviews shifted from evaluating process and policy compliance to assessing state efforts to achieve outcomes in these areas. In January 2000, HHS announced a new federal performance review process for state child welfare agencies, called the Child and Family Services Review (CFSR). The CFSR process is an intensive review of state child welfare systems that assesses state agency performance using information gathered from a statewide data profile of CFSR measures, a statewide self-assessment, and a week-long on-site review. The review process concludes with a final report, identifying areas that were found to be strengths and areas

needing improvement. The state uses these findings to develop and implement a corrective action plan called the Program Improvement Plan (PIP). Collectively, the elements of the CFSR represent a continuous quality improvement process for state child welfare systems in which specified performance measures identify areas of practice that can be improved to achieve better outcomes for children.

Because the CFSR serves as an oversight process for the federal government to assess performance of State child welfare agencies, it has had an important influence on child welfare performance measurement. It defines the context within which State agencies measure their own performance and that of local offices. The Children's Bureau advises state legislatures that the CFSR should serve a valuable resource for overseeing performance of local agencies and emphasize that, "local accountability for the achievement of positive outcomes in child welfare is an issue for all States, especially those with systems that are county-administered" (U.S. Department of Health and Human Services, Administration on Children, Youth and Families, Children's Bureau, 2007a). Fundamentally, the CFSR created a context for performance measurement that has been adopted by many states as a way to monitor performance of local child welfare agencies. Many states have incorporated aspects of the CFSR, especially the measures used for the CFSR, into their own oversight reviews of county or local agencies (U.S. Government Accountability Office, 2004). Whether states adopt the CFSR measures or use the CFSR as a foundation to build their own measures of accountability, the performance of a state child welfare agency is only as good as the data and methods used to assess performance and is dependent on the performance of all of the local child welfare agencies. Therefore, it is important to understand the both the role of local

variability and the measurement challenges related to measuring child welfare agency performance.

Role of Local Variability in Measuring Performance

Statewide performance measures in child welfare represent an aggregate of the experiences of all the children involved in the child welfare system throughout the state. These children, however, are served by distinct local child welfare agencies within counties, regions, or other local units, which operate with a unique set of factors that may contribute to differences in how well agencies achieve outcomes. Local child welfare agencies vary because of differences among the characteristics of children entering the system, the conditions of the counties they serve, as well as the policies and practices of the local agency itself. These differences in local factors contribute to differences in the experiences of children in the child welfare agencies, including their achievement of desired outcomes.

Given that the CFSR has established the current performance measurement framework for child welfare agencies, it is important to understand that it acknowledges local variability and promotes local accountability. Although the CFSR process predominantly focuses on overall state performance, it recognizes the importance of local variation by relying on a variety of local information when evaluating statewide performance, including conducting local case record reviews and incorporating composite measure weighting based on size of localities. While the purpose of the CFSR is to ensure states achieve the same desired outcomes for children, this does not imply that the CFSR aims to reduce local variability as a means to achieve these outcomes. Because of the devolution of authority to state child welfare agencies, state and local agencies have the flexibility and authority to make individualized policy and practice decisions to best meet the needs of their local

community. Given that local variability is an inherent part of the structure and accountability of the child welfare system in the United States, it is important to examine performance measurement from states' perspective of overseeing local child welfare agencies and to evaluate how local variability of factors impact statewide performance. Although certain aspects of the CFSR process have a local focus, current child welfare performance measures aggregate the experiences of children across the state, and therefore, fail to accurately account for the role of local variability.

Despite local variability of differences in children's characteristics and differences among the counties they live in and agencies serving them, all children are considered equivalent and are expected to achieve the same outcomes. This notion is reflective of a systems theory concept called equifinality, that the same final outcome can be achieved from multiple paths and varying conditions (Katz & Kahn, 1967). Therefore, it is desirable and necessary for all children, regardless of their differences, to be able to achieve common positive safety, permanency, and well-being outcomes. However, individual and county-level differences play a role in how quickly and effectively children attain these outcomes, which are used as indicators of child welfare agency performance.

The extent to which variability of child and local factors are related to child welfare agency performance on outcome measures is unknown. Evaluating these individual and county-level factors in relation to their impact on statewide outcome measures, may enhance a state's ability to accurately assess their own performance, identify areas that can benefit from targeted improvement efforts, and ultimately increase achievement of positive outcomes for children. If certain local conditions contribute to better or worse outcomes for children, such information would be important for developing targeted child welfare policy

and practice. The reasons for such variation often differ across localities. Some local child welfare agencies may serve more children with particular characteristics, such as an increased number of infants coming into foster care or an increased number of neglect cases. Other agencies may face different demographic and socioeconomic conditions in the local community associated with high levels of unemployment or poverty. Finally, the variation may be rooted in different staffing patterns, policies or practices within the child welfare agency, such as a policy to emphasize use of relative care and minimize use of non-family placements. While some of these differences can be controlled by the agency, it is important to note that most factors are outside the control of the agency. Nevertheless, these individual- and macro-level differences combine to produce a particular set of operating conditions for each local agency or office, creating a unique shared environment for children whose experiences and achievement of outcomes may be influenced by these factors.

In regard to individual-level factors, the majority of child welfare research examines how various characteristics of children are related to their likelihood of attaining certain safety and permanency outcomes, but little research evaluates these factors in a broader context of how these factors may impact achievement of agency performance measures. Research has demonstrated how children from certain races or age groups may experience different rates of victimization, likelihoods of achieving outcomes, and disparity among children entering the child welfare system (Wulczyn, Barth, Yuan, Harden, & Landsverk, 2005; Wulczyn & Lery, 2007). Yet if the demographics of a child welfare agency have a disproportionate amount of children from certain racial or age groups identified as having a decreased likelihood of attaining desirable outcomes, the overall agency may also have difficulty achieving performance measures these outcomes. While it is not appropriate to

excuse agencies from achieving high standards of performance due to the demographics of their child welfare caseload, it remains an important consideration when assessing whether child welfare agencies can achieve performance goals.

Furthermore, in addition to individual factors, children encounter the child welfare system differently depending on the macro-level policies, practices, and demographics of the local child welfare agency. Because local agencies are consolidated when estimating aggregate statewide performance measures, the influence of county and agency variability is unknown. However, it is these local differences among agencies that may facilitate success or struggle in their efforts to achieve desirable outcomes for children and meet performance standards. Some agencies may be struggling to meet their performance goals if they serve children and families in a county with high poverty and few services providers, while other agencies may experience exceptional excellence on performance measures due to their involvement in an innovative policy or practice reform effort. It is also important to note that many of these county and agency differences are not controlled by the agency, such as poverty and whether they serve a rural community, but there are also factors where the agency does have control, such as participating in a reform effort, which may lead to more desirable outcomes. Regardless of whether county factors are under the authority of the agencies, assessing these factors can help to identify areas of policy and practice that may need more attention in order to improve performance. Understanding how differences in local agency and county factors may impact statewide performance measures can help agencies make more informed decisions regarding improvement efforts and facilitate achievement of positive outcomes for children.

Because there are some differences among children and local agencies that may be related to achievement of outcomes, a few efforts have been made by child welfare agencies and researchers to estimate child welfare performance measures based on characteristics of children and counties. For example, North Carolina has analytical capability to generate performance measures for different gender, race, ethnicity, and age groups in addition to estimating measures for counties of a similar size and for judicial districts (Duncan et al., 2008). This allows for comparisons that help to identify groups of children and counties that may be having more difficulty in achieving outcome measures. However, further analysis is needed that can assess to extent to which these and other child and agency factors may be related to the achievement of statewide child welfare outcome measures. Given the evolution of child welfare performance measures and their escalated importance with the CFSR, it is essential that research continues to explore these emerging new directions for child welfare performance measures, in order to ensure their accuracy and maximize their potential to inform state and local agencies about how well they are achieving desirable outcomes for children.

Challenges with Measuring Performance

The dynamic environment in which child welfare programs operate varies across time as well as across local jurisdictions, thereby complicating efforts to measure performance and assess the effectiveness of particular policies and practices. Among numerous measurement concerns, the issue receiving the most attention has been the use of cross-sectional data rather than longitudinal data. Much research supports the need to use longitudinal data, since this approach ensures full representation of all children's experiences throughout the entire time they are involved with the child welfare system (Courtney & Collins, 1994; U.S. Government

Accountability Office, 2004; Usher & Gibbs, 1995; Usher, Randolph, & Gogan, 1999; Usher, Wildfire, & Gibbs, 1999; Webster, Needell, & Wildfire, 2002; Webster, Usher, Needell, & Wildfire, 2008; Wulczyn, 1996). Current federal measures, however, rely on cross-sectional data that is inherently biased to include an overrepresentation of children who remain in care for longer periods of time. Using longitudinal data and methods for estimating performance measures includes information about all children in care for a more accurate representation of performance.

Additionally, an often overlooked measurement issue of child welfare data is that children are served by local child welfare agencies, creating a need for a multi-level perspective. Because of this nested nature of children within county child welfare agencies, it creates autocorrelated or nonindependent data, which may influence the achievement of outcomes as captured by performance measures. Accounting for this autocorrelation can reduce measurement bias, since simply aggregating data from all children across a state incorrectly assumes independence among children and events during their involvement with the child welfare system. While there has been some research that uses multi-level models to address the nested nature of child welfare data in regard to children nested within sibling groups (Guo & Wells, 2003) and children nested within neighborhoods or communities (Coulton, Korbin, & Su, 1999; Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007; Drake, Jonson-Reid, & Sapokaite, 2006), little research is available that uses multi-level models to evaluate children nested within local child welfare agencies to assess what multi-level factors are related to performance measures (Brown, 2005). Using longitudinal data combined with a multi-level analytical method can help to accurately assess agency performance while incorporating the influence of local variability.

Need for Research to Develop Targeted Performance Measures

Research that uses the appropriate analytical methods to account for both the need to use longitudinal data and the issue of multi-level data can provide insight into what factors, among characteristics of children, counties, and agencies, may influence local variation and the achievement of performance measures. Relevant individual, county, and agency characteristics can then be used to estimate targeted performance measures, which can provide to a better understanding of children's experiences and their achievement of desired outcomes. Although child welfare agencies should strive to achieve the same desired outcomes for children regardless of varying child, county, and agency characteristics, studying the relationship these factors have with achieving performance measures can contribute to a better understanding of how to target improvement efforts for policy and practice.

Performance measures should serve as useful tools to promote accountability and identify priorities for improvement efforts. While the current federal efforts to assess child welfare agency performance are limited in their ability to accurately reflect the experiences of children involved in the child welfare system, states and researchers have been making strides toward developing improved more useful performance measures based on longitudinal data (Duncan et al., 2008; Needell et al., 2008; Usher, Locklin, Wildfire, & Harris, 2001; Wulczyn, Chen, & Hislop, 2007). These efforts can be enhanced by further evaluating the role of various aspects of local variability on achieving performance, specifically in regard to differences in the characteristics of the children in the child welfare system, differences in policies and practices of the local child welfare agency, as well as differences in the surrounding economic environment and demographics of the county.

Theoretical and Conceptual Foundation

Performance measurement of child welfare agencies is a topic that relates to a variety of disciplines, yet struggles to be firmly rooted in a particular theoretical or contextual perspective. Depending on the primary objectives when assessing child welfare performance measures, a number of perspectives can be applicable. When research assessing child welfare performance measures focuses on children's experiences and abilities to achieve outcomes, human development theories can be very beneficial. Development theory can help to understand the developmental context in which maltreatment occurs, consequences for developmental outcomes, and differences in achievement of outcomes across various developmental stages. In particular, ecological theory is a commonly used developmental theory when studying child welfare outcomes, since it establishes a framework for evaluating children's outcomes that incorporates influential factors that interact with one another in a broad, multi-systemic context (Wulczyn et al., 2005). Fundamentally, ecological theory emphasizes the conceptualization of children's development within a broader context of interconnected factors at multiple levels of the surrounding environment (Bronfenbrenner, 1979; Lerner, 2005). Several child welfare researchers have successfully applied ecological theory when studying the etiology and outcomes of child maltreatment (Belsky, 1980; Garbarino, 1977; Cicchetti & Lynch, 1993; Krishnan & Morrison, 1995; Weissman, Jogerst, & Dawson, 2003; Scannapieco & Connell-Carrick, 2005; Wulczyn, Barth, Yuan, Harden, & Landsverk, 2005; Drake et al., 2006). For the purpose of evaluating multiple levels of characteristics of children nested within agencies and counties and how they are related to achievement of safety and permanency outcomes, ecological theory served as a useful

theoretical framework, given its emphasis on the relationship between children and their environment.

Because accountability is a primary function of child welfare performance measures, research in this area can also benefit from theories and perspectives looking beyond the individual to the measurement and evaluation of organizations and systems. Some research has placed child welfare performance measures into a measurement context, such as assessing population dynamics and sampling, while other research has placed the role of child welfare performance measures in a management and evaluation context, such as self-evaluation and continuous quality improvement (Usher et al., 2001; Webster et al., 2002; Wulczyn, 1991; Wulczyn, Kogan, & Dilts, 2001; Wulczyn, 2007). In addition, other research has used organizational theory as a foundation and emphasized the role of child welfare performance measures as part of organizational change efforts and creating a culture of organizational learning (English, Brandford, & Coghlan, 2000; Moore, Rapp, & Roberts, 2000). However, given the critical dual function of child welfare performance measures to assess children's outcomes but also to ultimately hold child welfare agencies professionally responsible, the literature from diverse disciplines on performance measurement and accountability provided the most useful contextual framework for understanding the role of using children's outcomes as accountability measures and how various child, county, and agency factors influence achievement of statewide performance standards (Barth, 1997; Behn, 2002; Behn, 2003; Ben-Arieh, 2002; Ben-Arieh & Goerge, 2006; Benbenishty & Oyserman, 1996; Courty & Marschke, 2003; Dubnick, 2005; Hatry, 2006; Heinrich, 2002; Heinrich, 2004; Kamensky, Morales, & Abramson, 2005; Magura & Moses, 1980; Mausolff, 2004; Metzenbaum, 2005; Orthner & Bowen, 2004; Spitzer, 2007; Radin, 2006; Traglia,

Massinga, Pecora, & Paddock, 1996; Usher, Locklin, Wildfire, & Harris, 2001; Webster, Usher, Needell, & Wildfire, 2008 ; Wholey & Hatry, 1992; Wulczyn, 1996; Wulczyn, 2007; Yoo, Brooks, & Patti, 2007).

Given the variety of perspectives, a thorough examination of child welfare performance measures should use a combination of frameworks from both the individual developmental perspective, to understand factors related to achievement of children's outcomes, and the organizational perspective, to understand the context and need for meaningful performance measures. Specifically, ecological theory along with organizational performance measurement and accountability perspectives provided a useful theoretical and contextual foundation for evaluating the extent to which child and local characteristics play a role in measuring statewide performance of child welfare agencies.

Review of Literature

With the growing importance of accountability and the need for useful and accurate performance measures, research is needed to guide the selection of factors that could be used for estimating performance measures. Although prior research has provided insight into identifying factors related to child welfare permanency outcomes, previous research generally does not focus on the performance measurement perspective and fails to use the appropriate data and methods to assess achievement of outcomes while controlling for the nested nature of children within local agencies. Despite these limitations, prior research can serve as a starting point for selecting factors that can be evaluated with this research to understand what factors may be related to achieving timely permanency, specifically reunification, adoption, guardianship or custody, or emancipation.

Permanency Outcomes

Children can achieve several different types of permanency exits from foster care. While reunification, adoption, and guardianship or custody are viewed as the most desirable permanency outcomes, older children can also achieve permanency through emancipation when they age out of the foster care system. Prior research has shown that the probability of achieving a certain type of permanency exit changes with the length of time the child remains in care (Wulczyn et al., 2007). Specifically, there is higher likelihood of reunification during the first few months in care but then diminishes gradually over time. On the contrary, the likelihood of adoption is initially low, but increases to a certain extent as the child remains in care longer. Using data from the Multistate Foster Care Data Archive from 2000 through 2005, during the first 22 months in care, children are more likely to exit to reunification than any other type of exit, yet after 22 months in care, children have the greatest probability of exiting to adoption (Wulczyn et al., 2007).

Child Characteristics

Several characteristics of children are frequently used in assessing achievement of permanency outcomes. Specifically, age, gender, race, and ethnicity are the four factors most commonly used in research with performance measures to assess differences in permanency based on individual characteristics (Duncan et al., 2008; Needell et al., 2008; Wulczyn, 1991; Wulczyn, Barth, Yuan, Harden, & Landsverk, 2005; Wulczyn & Lery, 2007; Wulczyn et al., 2007). It is important to include these characteristics in assessing how well agencies achieve permanency outcomes for children, because counties vary with regard to the population dynamics of children entering care among county child welfare agencies (Wulczyn et al., 2001; Wulczyn & Lery, 2007; Wulczyn, 2007).

Moreover, there is extensive research evaluating how age, race, and ethnicity related to length of time in care and achievement of permanency outcomes. In regard to age, research has shown that infants generally tend to stay in care longer than other age groups, while teenagers stay in care for shorter periods of time (Wulczyn et al., 2007). Although infants are reunified at slower rates than children of all other ages, they are adopted at much quicker rates than older children (Guo & Wells, 2003; Wulczyn et al., 2005). In addition, younger children are generally more likely to be adopted and less likely to be discharged to relatives or other guardians, while older children are more likely to be reunified yet less likely to be adopted or living with relatives (Courtney & Wong, 1996; Wulczyn et al., 2001; Wulczyn et al., 2005; Wulczyn et al., 2007). Also, research has demonstrated that as the likelihood of adoption decreases with age, the likelihood increases of exiting care to nonpermanent exits, such as emancipation or running away (Courtney & Wong, 1996; Wulczyn et al., 2005).

Also, in regard to race and ethnicity, prior research has found that African American children tend to stay in foster care longer than White or Hispanic children (Wulczyn et al., 2005; Wulczyn et al., 2007). Research has also shown that African Americans and Hispanic children are less likely to exit to adoption than White children (Courtney & Wong, 1996; Wulczyn et al., 2001). Also, African American children are less likely to be discharged to guardianship or custody with relatives or other caretakers (Courtney & Wong, 1996). Prior research has also shown that White and Hispanic children are more likely to be reunified than African American children (Wulczyn et al., 2007). However, when African American children did exit to reunification, they did so at a rate that was slower than that of White children (Wells & Guo, 1999).

Also, because children enter foster care for different reasons, this may influence the time it takes them to achieve a desirable permanency outcome. Research has shown that children in care due to neglect have an increased likelihood of reunification compared to other reasons for placement (Courtney & Wong, 1996), although other research has demonstrated that children who are in custody due to neglect achieve reunification at a slower rate than those children who were physically abused (Guo & Wells, 2003; Wells & Guo, 1999). However, children placed in foster care due to physical abuse have a decreased likelihood of adoption related to other reasons for removal (Courtney & Wong, 1996).

While most research includes gender in the analysis of achievement of permanency outcomes, few studies have found significant differences with gender in attaining timely permanency outcomes. While one study found that females are more likely than males to exit care by running away (Courtney & Wong, 1996), other research has only found gender differences when looking at gender jointly with other child characteristics (Wildfire, Barth, & Green, 2007).

With evidence of children's characteristics being related to achieving timely permanency outcomes, some studies have looked at the combined impact of several characteristics of children on achieving permanency outcomes. Specifically, a study by Wildfire, Barth, and Green (2007) evaluated how child characteristics of age, race, gender, and type of maltreatment influenced their likelihood of being reunified. African American children younger than 7 months old had the lowest likelihood of reunification, while White children ages 11 to 15 had the greatest likelihood of reunification. This research also showed that infants who were neglected left custody at slower rates than infants who were physically abused. Also, the rate of reunification of African American infants was less than half of that

for White infants. For 3 to 5 years olds, males had higher reunification rates than females, and children experiencing sexual abuse were less likely to be reunified than those who were physically abused. Among children ages 6 to 10, males reunified quicker than females. Also, African American children older than the age of 10 had lower rates of reunification than whites

Despite extensive previous research analyzing child characteristics related to achievement of permanency outcomes, only one recent study by McDonald and colleagues (2007) can be used as precedence in regard to analyzing these relationships using a competing risk model. This research found that the child's age at time of entry into custody was significantly related to all permanency outcomes. In particular, as children got older, they were less likely to be adopted and more likely to be emancipated. In regard to adoption, African American children and Native American children were less likely to be adopted than White children, and children who experienced physical abuse and sexual abuse were less likely to be adopted. This study also showed that children were less likely to exit to relative custody if they were Native American or were victims of sexual abuse. Also, children were less likely to exit to emancipation if they were sexually abused. The use of the competing risk model in this study serves as the only other study which allows for a comparison of the effects of child characteristics on each type of permanency outcome.

County Child Welfare Agency Characteristics

County child welfare agencies are held to performance standards in achieving child welfare outcomes, however little research exits examining the characteristics of local child welfare agencies in regard to how they influence the achievement of children's outcomes (Wells, 2006). Also, child welfare workers within these local agencies play an important role

in enabling children to achieve permanency outcomes. Research has highlighted the importance of child welfare agency factors, particularly in regard to their staff and their organizational policies and practices (Weissman, Jogerst, & Dawson, 2003; Wells, Lyons, Doueck, Brown, & Thomas, 2004). In particular, prior research has shown that high turnover of workers and staffing shortages may lead to negative outcomes for children involved in the child welfare system, including achieving timely permanency outcomes (DePanfilis & Zlotnik, 2008; U.S. Government Accountability Office, 2003).

Also, the type of policies and practices followed by the local agencies are important to consider, since their use of certain types of placements shapes the experience of children in custody. In particular, it is important to assess the extent to which county agencies use relative placements and how this impacts achievement of permanency outcomes. Prior research has found that children placed in relative placements are less likely to exit custody to any type of permanency outcome (Courtney & Wong, 1996), however other research, did not find any differences in regard to the rate of reunification between children placed into relative foster care compared to children placed in non-relative family foster care (Wells & Guo, 1999). Similarly, the agency's use of non-family placements, such a group homes, can influence the children's ability to achieve timely permanency outcomes. Specifically, some research has shown that placements in non-family settings are associated with lower likelihood of being adopted or exiting to custody or guardianship with relatives or other caretakers (Courtney & Wong, 1996; Wulczyn et al., 2007). Also, research has shown that placement in group care is associated with greater likelihood or running away (Courtney & Wong, 1996).

Furthermore, child welfare agencies have been involved in a variety of reform efforts in recent years, and their involvement in these efforts may influence timely achievement of permanency outcomes. Specifically, the number of counties that have adopted family courts to manage child maltreatment cases has increased in North Carolina since the first courts stared in 1999 (North Carolina Administrative Office of the Courts, 2008). They are intended to expedite the judicial process for children involved in the foster care system, which hopefully would decrease the time it takes for children to achieve permanency.

In addition, the Multiple Response System (MRS), which is an alternative response approach to assessing cases, has been gradually implemented across all counties in North Carolina (North Carolina Department of Health and Human Services, North Carolina Division of Social Services, 2008). This effort may directly impact the ability of counties to achieve timely performance outcomes, since only the more severe cases of maltreatment will be investigated and accepted into custody, while other less severe cases will be served with an assessment track to provide services to these children without taking them into custody.

Furthermore, North Carolina counties have been actively engaged in several reform efforts in recent years, including the IV-E Waiver demonstration, the Families for Kids initiative, and the Family to Family initiatives. Counties that have participated in these initiatives have taken proactive steps to engage in efforts that would improve permanency outcomes for children, including shorter lengths of stay in care. County involvement in these efforts can be viewed as an indicator of the culture of the organization in regard to their willingness to engage in reform to improve outcomes. Given these various efforts aim to achieve positive permanency outcomes for children, it is important to include them in

analysis to assess their role in contributing to county variation of achieving timely permanency outcomes.

County Characteristics

The characteristics of the county in which the child is served may influence several aspects of a child's ability to achieve permanency. Some research on child welfare agency performance has looked at comparing child welfare agencies among counties of similar size (Duncan et al., 2008; Usher, Locklin, Wildfire, & Harris, 2001). Geographic and community characteristics, specifically urban status, poverty levels, and unemployment rates, are also increasingly being included in studies of child welfare outcomes (Wulczyn & Hislop, 2003).

Prior research has shown that children from rural counties generally have shorter stays in foster care, while children from urban areas have longer stays in foster care (Wulczyn et al., 2007). While some research has shown that children from urban areas are less likely to be reunified than children in rural areas (Wulczyn et al., 2007), other research found that children from urban areas also have lower likelihoods of adoption (Courtney & Wong, 1996). Additionally, research has shown that children from rural areas have a lower likelihood of adoption but a greater likelihood of being discharged to relatives or other guardians than those from urban areas (Courtney & Wong, 1996).

In addition, prior research has also shown that children from poor families that receive welfare assistance have a decreased likelihood of being adopted or of being discharged to relatives or others for guardianship or custody than those not receiving welfare (Courtney & Wong, 1996). Other research has shown that increases in maternal income help to reunify children more quickly, while losing cash assistance contributes to slower

reunification compared to those who did not lose their assistance (Guo & Wells, 2003; Wells & Guo, 2004).

Additionally, a growing body of literature has emerged that has focused on studying the relationship of neighborhood characteristics in regard to maltreatment outcomes, which found significant relationships between higher rates of maltreatment and increased population, high poverty rates, high unemployment rates, and high violent crime rates (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007; Freisthier, Merritt, & LaScala, 2006; Krishnan & Morrison, 1995; Weissman et al., 2003). However, most of this research evaluates etiology and rates of maltreatment, while more research is needed to explore how county, neighborhood, and community characteristics influence achievement of permanency outcomes.

Most prior research on child, agency, and county characteristics has not explored achievement of permanency outcomes from a performance measurement perspective, in regard to how local variability can influence achievement of outcome measures. Furthermore, even though prior research fails to use a multilevel analysis of children nested within county agencies, this research provides fundamental insight into which characteristics might be related to achieving permanency outcomes and can serve as a guide for identifying variables to include in this analysis.

Research Aims

The purpose of this research was to explore what child, agency, and county factors are related to achieving timely permanency outcomes for children involved in the child welfare system. Longitudinal child welfare administrative data was used to ensure that all children entering care are included in the analysis and that information is obtained about their

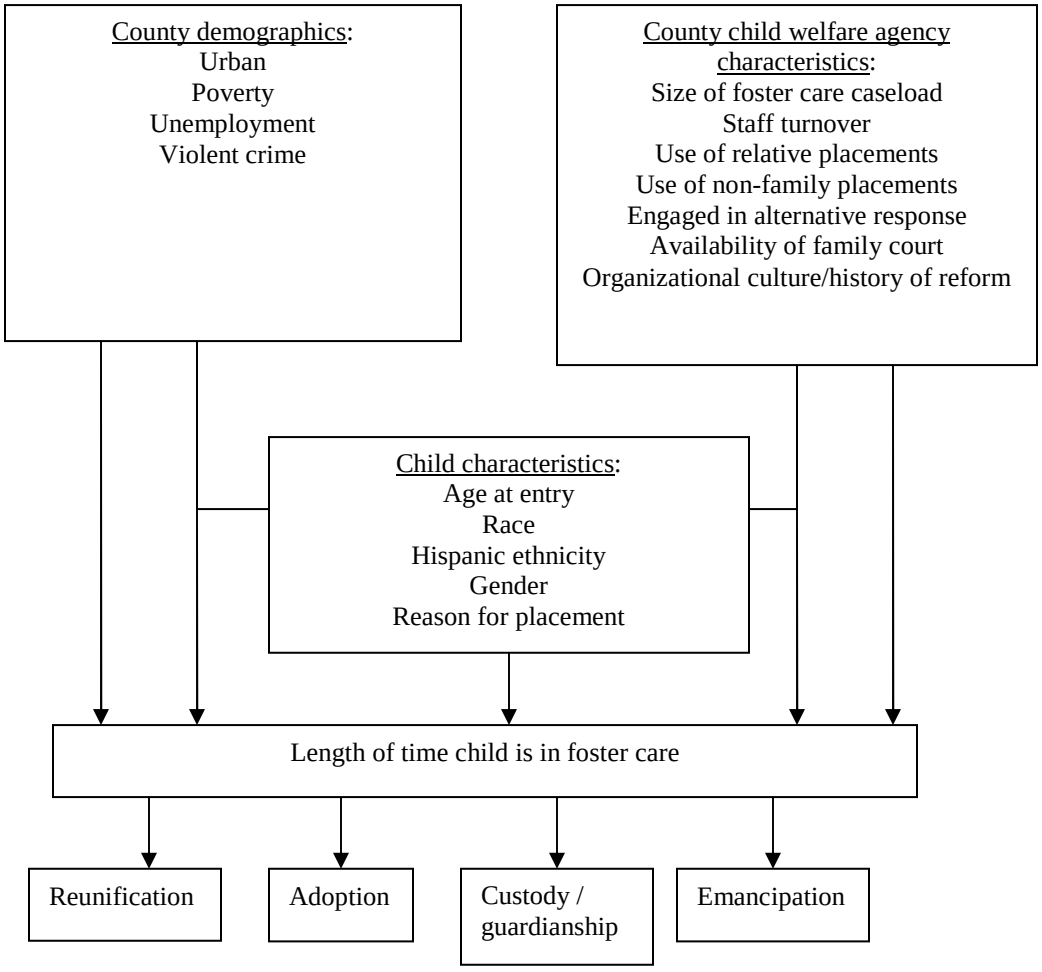
experiences over time. Given that children involved in the child welfare system can achieve different types of permanency outcomes, this research assessed what factors were associated with achieving each type of permanency, including reunification, adoption, guardianship or custody, and emancipation. In addition, using an ecological perspective required assessing not only the relationship between the child's individual characteristics and the achievement of the permanency outcomes, but also the relationship of broader environmental factors, including the characteristics of the local child welfare agency as well as the demographics of the county in which the child is being served. Therefore, given the variety of permanency outcomes and the various levels of characteristics to be evaluated, this research used a multi-level analytic strategy and also assessed competing risks of achieving timely permanency outcomes.

Conceptual Framework

A conceptual model is shown in Figure I, which depicts how county, agency, and child factors were perceived to relate to achievement of timely child welfare permanency outcomes.

Figure I

Conceptual model of evaluating county, agency, and child characteristics in relation to achieving timely permanency outcomes



Significance of Study

This research served as the first study that utilized multi-level analytic methods to evaluate child welfare data, while accounting for children nested within county child welfare agencies. Timely achievement of permanency outcomes was a goal highlighted by the Adoption and Safe Families Act of 1997 and assessed by the CFSR (45 C.F.R. 1355). However, factors contributing to local variation may influence how well a child welfare agency can achieve these outcomes. By understanding how timely performance outcomes are

related to local county and agency factors as well as individual factors of the child, performance measures can be estimated according to these factors to help identify differences in performance. Assessing agency performance stratified by subgroups of related factors can help agency officials identify areas needing improvement efforts, allowing them to target resources to those areas and to better understand the dynamics of how well subpopulations of their caseload are achieving outcomes. Furthermore, understanding how contextual factors relate to achievement of performance outcomes can not only motivate state and local agencies to go beyond the current federal measures by estimating their performance by subgroups, this research can also promote discussion for future revisions of the federal CFSR measures to include more targeted measures and to account for differences in local variation. With potentially endless possibilities of factors contributing to local variability, this research helped to establish a much-needed evidence base for identifying significant child, agency, and county factors, while applying appropriate data and methods.

Chapter 2: Research Questions and Methods

Research Question

To begin building an evidence base that identifies factors affecting the performance of child welfare agencies, the following research question was evaluated:

> How are child, agency, and county contextual factors related to achieving timely permanency outcomes for children in foster care?

Specifically, the permanency outcomes evaluated in this study were time to reunification, adoption, guardianship or custody, and emancipation. Although prior research identified some factors related to permanency outcomes, research is needed that approaches the question from the perspective of performance measurement. Furthermore, none of the available research used data and methods necessary to control for the multilevel nature of children nested within county agencies while also assessing the competing risks of multiple types of permanency outcomes. Identifying child, agency, and county factors that are related to achieving timely permanency outcomes can be useful for selecting factors to estimate performance measures by subgroups and identify specific areas that could be targeted for improvement efforts.

Research Hypotheses

This research used five hypotheses that addressed the various components of the research question:

1. Child characteristics are related to achieving timely permanency outcomes.

2. Child welfare agency characteristics are related to achieving timely permanency outcomes.
3. County demographics are related to achieving timely permanency outcomes.
4. Cross-level interactions between child characteristics and child welfare agency characteristics are related to achieving timely permanency outcomes.
5. Cross-level interactions between child characteristics and county demographics are related to achieving timely permanency outcomes.

Study Sample and Time Frame

The sample for this study was the population of all children who entered child welfare custody for the first time in North Carolina in the calendar years 2002 through 2005. Specifically, the study sample was composed of a total of 22,316 children who entered custody for the first time in North Carolina from January 1, 2002 through December 31, 2005. Information about the experiences of these children from the time they entered care through a three-year follow-up timeframe was included in the study. For example, using an entry cohort perspective based on calendar years, the study timeframe for all children entering child welfare custody in 2002 was 3 years from their date of entry, which would conclude in 2005. A three-year follow-up period was used to ensure that a sufficient number of children had an adequate amount of time to achieve permanency exits that typically take longer periods of time to achieve, such as adoption. A total of 19,024 children (85.25%) achieved some type of foster care exit within the three-year study window.

Study Data

This research utilized data from several administrative and survey data sources that have been collected for purposes other than this study.

Child-Level Child Welfare Data

UNC longitudinal child welfare data.

The primary data for children and their experiences in the child welfare system was obtained from the University of North Carolina (UNC) longitudinal child welfare data file, which was a longitudinal data set of child welfare administrative data from the North Carolina Division of Social Services (NC-DSS) (Duncan et al., 2008). This dataset had information about all children in NC-DSS custody throughout their time in care and provided information about children's characteristics and their experiences in child welfare custody, including their type of exit and the time to achieve various permanency outcomes.

County-Level Child Welfare Agency Data

Because some county child welfare agency information may change over time, data about county child welfare agency characteristics was obtained for each county for each entry cohort. Therefore, children who entered custody from a particular county in a given year were associated with county agency data for the year in which they entered. Although children who remain in custody for several years may be influenced by county agency characteristics from several years, data from the year they entered was used since it could be argued that the environment of the agencies at the time the child first entered care had the most influence on their experience and length of time in custody. Consequently, each county had child welfare agency data for each of the calendar years of 2002, 2003, 2004, and 2005 to correspond with each of the entry cohorts used in the study. Therefore, any county child welfare agency characteristics that changed from year to year varied accordingly. County child welfare agency data came from several sources.

UNC longitudinal child welfare data.

Several variables regarding county child welfare characteristics were estimated from the UNC longitudinal child welfare dataset. In particular, the size of the foster care caseload for county child welfare agencies was obtained from the UNC longitudinal child welfare data. Also, data regarding county agencies' practices regarding using different types of placement setting were also estimated, specifically the percentage of children placed in non-family or group/institutional placements and children placed with relatives. Given that information about caseload size and use of types of placements may vary from year to year, this data was collected or estimated for each county for each entry cohort year.

NC-DSS staffing survey data.

The NC-DSS annual staffing survey was used to provide information about the staffing characteristics of each county child welfare agency. This survey was annually administered by NC-DSS to all county child welfare agencies, so this information was available for all counties for each of the years used for this study (2002-2005). Specifically, data was available for each county agency regarding social work staff turnover.

NC-DSS Web site regarding Multiple Response System.

Information about county child welfare agencies and their involvement in various child welfare reform efforts that addressed permanency outcomes were also obtained from several sources. In particular, data was obtained from the NC-DSS Web site regarding the year each county began implementing a multiple response system (MRS) to provide an alternative response approach to assessing reports of child maltreatment. There were 10 counties that first implemented MRS in 2002, with 42 other counties starting MRS in 2003, and the remaining 48 counties beginning MRS in 2006.

NC Administrative Office of the Courts Web site regarding family courts.

Some child welfare agencies operated in counties which had family courts that specialize in child maltreatment cases. Data about which counties had family courts and the year in which they began were obtained from the Web site for the North Carolina Administrative Office of the Courts. There was a total of 22 counties with family courts, with the first family courts starting in six counties in 1999.

NC-DSS Web site regarding child welfare reform initiatives.

Information about counties' histories of engaging in various child welfare reform efforts was obtained from information and documentation about the initiatives on the NC-DSS Web site. This information was used to develop a measure assessing whether county child welfare agencies had a history of involvement in reform efforts, specifically the IV-E Waiver demonstrations, the Families for Kids, and the Family to Family initiatives.

County-Level Demographic Data

As with county child welfare agency data, county demographic information varied from year to year. Therefore, when available, demographic information was obtained for each county for each entry cohort year, where children entering child welfare custody in a county in a particular year were associated with that county's demographic information for that year. Similarly it can be argued that children in care for more than one year may be influenced by county demographic conditions from several years. However, the county demographic information from the year they entered custody was used because these conditions may impact both the reasons why they entered custody as well as the situations surrounding placement decisions when first entering custody, which may have an influence

on their permanency planning and their length of time in custody. Several sources of data were used to obtain the county demographic data.

U.S. Census Bureau data regarding population and urban status.

Information about counties' urban status was obtained from the U.S. Census Bureau, however estimates were only available for the percentage of a county that was classified as urban using data from the 2000 census, making this one of the few county-level measures that was only available for one year and could not be estimated separately for each entry cohort year.

U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE) data.

Poverty data was obtained from the U.S. Census Bureau's Small Area Income and Poverty Estimates (SAIPE) Program, where information was available on the percentage of people in poverty for each county for each entry cohort year from 2002 through 2005.

U.S. Department of Labor, Local Area Unemployment data.

Data on unemployment rates for each county were available for each of the entry cohort years of 2002 through 2005 using from the U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment statistics (LAUS).

North Carolina Department of Justice, Uniform Crime Reporting data.

Data was obtained from the North Carolina Department of Justice from the Uniform Crime Reporting Program on the number of violence crimes in each county for each entry cohort year of 2002 through 2005.

Measures

Dependent Variables: Time to Permanency

This research evaluated the child welfare performance measure of time to achieve permanency for children in foster care. It is generally perceived that shorter stays in foster care are desirable outcomes, as long as expediting time to permanency does not sacrifice the ability to ensure that the child is placed in a permanency situation that is safe and stable, reducing the likelihood that they will suffer subsequent maltreatment or return to foster care (Coakley & Berrick, 2007; Shaw, 2006; Wells & Guo, 1999). Children in foster care can achieve a number of different permanency outcomes, specifically reunification, adoption custody or guardianship, and emancipation. There are several other reasons why some children exit foster care, such as running away, transferring to another agency or another state, child death, or the placement authority was revoked for other reasons. While these other types of exits represent a range of reasons for exiting care, they are often not the reasons why the majority of children exit the foster care system and they do not represent achievement of a desirable permanency goal, therefore these cases will be censored in the analysis.

For each type of permanency, the time to achieve that event was obtained as dependent variables that were estimated as the time difference between the day the child entered care and the day they exited care. To assess how various independent variables influenced the achievement of these outcomes, hazard rates were used to estimate changes in speeds to achieve these permanency outcomes.

Reunification.

In general, the most desirable outcome for children in foster care is reunification with the child's birth parents, however this option is only feasible if the parent or parents are engaged in services and other efforts to ensure the child's safety will not be at risk. Time to reunification was estimated as a continuous variable using the UNC longitudinal child welfare data file. The length of time in days between the child's entry into custody until they exited care to reunification was estimated using placement authority beginning and ending dates and confirming their reason for exit was due to reunification with parents of primary caretaker. Given the categories for permanency types in the administrative data file, reunification in this study meant reunification with the parent or caretaker involved with the removal of the child. Permanency placement with a non-removal parent was considered achievement of custody or guardianship, since the NC-DSS administrative data classified placement with a non-removal parent as custody or guardianship rather than a reunification.

Adoption.

If reunification is not achievable for children, then adoption is often the next most desirable option for children in foster care. The information to measure time to adoption was also available from the UNC longitudinal child welfare data file. The measure was estimated as a continuous variable for the time in days from the date the child entered placement authority until they exited placement authority for those children whose reason for exit was adoption.

Guardianship or custody.

Children can also achieve permanency when relatives or other court approved caretakers are awarded legal custody or guardianship of the child. The time to achieve

permanency due to guardianship or custody was estimated as a continuous variable using the UNC longitudinal child welfare data file. The measures captured the time in days from date of entry to date of exit from placement authority and their reason for exit was due to guardianship or custody.

Emancipation.

Some children also age out of the foster care system once they are 18 years of age or older. Although emancipation is generally not a desirable permanency outcome for children in foster care, it does become the permanency goal for many older children in foster care who are deemed, appropriately or inappropriately, not to have other viable permanency options. Data from the UNC longitudinal child welfare data file was used to estimate a continuous variable for the time to emancipation, which was calculated from date the adolescent began placement authority until the last day of their placement authority and their reason for exit was due to emancipation.

Independent Variables: Child Characteristics

All of the variables measuring child characteristics were obtained from the UNC longitudinal child welfare data file.

Age.

For almost all analyses, age was measured in years and estimated at the date of the child's entry into foster care. This variable for age was primarily used as a continuous variable, yet was categorized as an ordinal variable for the competing risks analysis using the following age categories: 0-1, 2-12, and 13 or older. Only for the analysis of infants ages 0 to 1, was the measure for age estimated in units of months as opposed to years, to capture a greater degree of variation within this age group.

Race.

Race was measured as a dichotomous variable with the categories of white or children of color. White children were used as the reference group in the multivariate analysis, so results were depicted and discussed for children of color in relation to those children in the reference group.

Hispanic ethnicity.

Hispanic ethnicity was also measured as a dichotomous variable with the categories of Hispanic and non-Hispanic children. For multivariate analysis, non-Hispanic children were used as the reference group, so results were shown for Hispanic children in reference to those children that were not Hispanic.

Gender.

Gender was measured as a dichotomous variable with the categories of male and female children. Males were used as the reference group for multivariate analysis, so the results depict the relationship of females in comparison to males.

Reason for placement.

The child's reason for placement in foster care was measured as two separate dichotomous variables. The first measured captured whether the child had abuse as a reason for placement, where children without abuse as an identified reason for placement was used as the reference group for multivariate analysis. The second measure captured whether the child had neglect as a reason for placement, where children without neglect as a reason for placement was used as the reference group for multivariate analysis. These measures were assessed independently of each other, so that a child with both abuse and neglect would be

captured separately by both measures as having abuse as a reason for placement as well as neglect as a reason for placement.

Independent Variables: Agency Characteristics

Size of foster care caseload.

The size of a county agency's foster care caseload was estimated from the unique count of all children ever in foster care in each county during the particular calendar year. This information was obtained from children's placement authority information and the date they entered and exited custody. For analyses which estimated hazard ratios, this variable was transformed into units of 100 so that the analytical software could produce exact estimates, otherwise the hazard ratios were rounded and information was lost.

Staff turnover.

The measure capturing each county's staffing turnover was based on the calendar year vacancy rate among social work full-time equivalent (FTE) positions in each county, which was a statistic available in the NC-DSS staffing survey. The annual vacancy rate for social work FTE positions was used to measure social work staff turnover.

Use of relative placements.

A measure was constructed to assess a county agency's use of relative placements. The UNC longitudinal child welfare data was used to estimate the number of placements among all foster care placements within the calendar year where children are placed with relatives, to obtain the percentage of all placements that are relative placements.

Use of non-family placements.

A measure was developed to capture the county agency's use of non-family placement settings. The types of placements considered non-family placements included the

following: small and large group homes, residential schools, and emergency shelters. Data from the UNC longitudinal child welfare data file was used to estimate the number of placements in non-family settings among all foster care placements within the calendar year, to obtain the percentage of all placements that are non-family placements.

Engaged in MRS (alternative response).

A variable was constructed that captured whether a county was engaged in the state's MRS alternative response effort for each of the entry cohort years. The variable was a dichotomous variable for each county for each year, which identified whether or not the county was implementing MRS. Although eventually all 100 counties in NC implemented MRS, only 10 counties began this effort in 2002 with 42 other counties adopting MRS in 2003, while the remaining 48 counties began in 2006. For multivariate analysis, the reference group for this variable was the counties not engaged in alternative response, therefore results showed the relationship of counties implementing alternative response compared to this reference group.

Family court.

A measure was also developed to identify those counties that had family courts available to handle the child maltreatment cases in their county. This measure was a dichotomous variable for each entry cohort year for each county which identified whether or not the county child welfare agency had the availability of a family court in their county. The information about the years in which counties implement family courts was available from the Administrative Office of the Courts Web site, which showed that six counties implemented the first family courts in 1999, four additional counties followed in 2000, six other counties started family courts in 2001, one county each in 2004 and 2005 started family

courts, and the latest 4 counties began family courts in 2008. The reference group for this measure in the multivariate analysis was counties without family courts, so results depicted represent the relationship of counties with family courts compared to this reference group.

History of engaging in reform efforts.

A measure was developed to identify if a county child welfare agency had a history of engaging in child welfare reform efforts. A dichotomous measure for each county child welfare agency was estimated to capture whether or not they had participated in three of the major reform initiatives in North Caroline during the study time frame, specifically the Title IV-E waivers, the Families for Kids initiative, and the Family to Family initiative. While there were other reform efforts ongoing in the state during this time, these three initiatives were selected due to their objectives of improving permanency outcomes. The reference group for multivariate analysis of this measure was counties without a history of reform, so results depicted show how counties with a history of reform were related to the outcome compared to this reference group..

Although having a family court and engaging in alternative response could also be indictors of counties engaging in reform efforts, these variables were isolated as separate variables and not included in this measure, since they captured specific systemic reform efforts of the child welfare system that may influence time to achieve permanency differently.

Independent Variables: County Demographics

Urban status.

An urban status variable was used to identify the percentage of each county that was considered urban. This variable was available from the U.S. Census Bureau, however it was only available for the year 2000. The Census Bureau identified all “urban” areas as those

within an urbanized area or urban cluster. These urban areas were densely populated areas defined as "core census block groups or blocks that have a population density of at least 1,000 people per square mile and surround census blocks that have an overall density of at least 500 people per square mile"(U.S. Census Bureau, 2007). Because preliminary analysis identified urban status as highly correlated with the size of the foster care caseload, this variable was dropped from subsequent analysis.

Poverty.

A measure of poverty was used to estimate the percentage of people in each county that were identified as living in poverty. This poverty estimate was available from the U.S. Census Bureau, Small Area Income Poverty Estimates (SAIPE) data for each county for each entry cohort year. The SAIPE data from the years 2002 through 2004 were estimated using the Annual Social and Economic Supplements of the Current Population Survey, but the 2005 data was estimated using data from the American Community Survey. The definition of poverty used for the SAIPE data assessed whether or not a family was living in poverty using income thresholds for each family's set of the characteristics, including the number of people, number of related children under 18 years old, and whether the primary person in the household is over age 65 (U.S. Census Bureau, 2008).

Unemployment.

A variable was used to estimate each county's unemployment rate for each entry cohort year. The unemployment rate data for each county for each entry year was available from the U.S. Department of Labor, Bureau of Labor Statistics which has Local Area Unemployment statistics. The unemployment rate was based on the number of people unemployed among the total labor force in each county, where unemployment is identified as

those currently receiving unemployment insurance benefits and those who have exhausted their benefits (U.S. Department of Labor, Bureau of Labor Statistics, 2005).

Violent crime per 1,000.

A variable was used that estimated the extent of violent crime per 1,000 people in each county for each entry cohort year. The measure captured the number of violent crimes as the total of murders, rapes, robberies, and aggravated assaults report to law enforcement agencies, according to the North Carolina Uniform Crime Reporting Program, which is part of a nationwide voluntary reporting system, representing approximately 97% of the state's population. The data was available from the North Carolina Department of Justice (North Carolina Department of Justice, 2009).

Censoring Variable

To conduct survival analysis, a censoring variable was constructed, which was a dichotomous variable indicating whether or not the child experienced a permanency exit within the three year study time frame. A case was censored if the child either achieved permanency after the three year study window or the child did not have an exit date from foster care into a permanency goal, which could indicate the child was still remaining in care or, as is inevitable with any administrative data, there may have been missing data in regard to the date the child exited care. For these cases that were censored, the length of time in care was estimated to be the end point of the study window, which was three years or 1095 days. Also, as mentioned earlier, children that exit the foster care system for reasons other than reunification, adoption, custody or guardianship, or emancipation, were also considered censored, but their time to exit was estimated using the date they exited custody.

Data Analysis Procedures

This research used survival analysis with a competing risks analytical framework to evaluate child, agency, and county factors related to achieving timely permanency outcomes. The analysis was segregated into three parts.

The first part of the analysis involved descriptive analysis of the sample characteristics and preliminary analysis to assess the study data for multicollinearity, autocorrelation, and competing risks. Also, the first part of the analysis included assessing the extent of local variability by obtaining Kaplan Meier estimates of median times to achieve each type of permanency for each of the study covariates.

The second part of the analysis applied corrective Cox proportional models to estimate time to permanency for all children for three permanency outcomes – reunification, adoption, and guardianship or custody. These corrective-Cox models included the assessment of main effects along with the assessment of main effects plus cross-level interactions. To limit the scope of the analysis, the analysis of cross-level interactions was limited to assessing interactions between child and agency factors and interactions between child and county factors. Both theory-driven and data-driven approaches were used to identify which cross-level interactions were tested in this analysis. Only the child variables of age, race, and ethnicity were used to assess cross-level interactions with all agency and county variables. The child characteristics were selected given the extensive use of these child demographics in child welfare research and the growing use of these demographics to assess differences among children's age, race and ethnicity in achievement of permanency outcomes. Given the limited knowledge of the role of the agency and county contextual factors, a data-drive approach was used, which assessed all of the agency and county macro-level factors.

Although all cross-level interactions between the three child characteristics and each of the agency and county factors were evaluated, only those interactions remaining significant after testing them with all identified significant interactions were depicted in the results.

The third part of the analysis applied corrective-Cox proportional hazard models within a competing risks analytical framework to assess timely achievement of reunification, adoption, guardianship or custody, and emancipation. This part of the analysis was stratified by age groups to separately assess achievement of permanency outcomes for infants ages 0 to 1, children ages 2 through 12, and adolescents ages 13 and older. Given that competing risks analysis requires the same model to be assessed for each type of permanency outcome, only the main effects model was used in this analysis.

Because this study provided a unique contribution to the literature in applying both a multilevel survival model to assess children nested within county child welfare agencies along with a competing risks framework, both of these analytical approaches are described in further detail.

Corrective Cox Proportional Hazard Models

Corrected Cox proportional hazard models were used as a multilevel survival analysis to account for the autocorrelated data of children nested within county child welfare agencies. Because children's experiences were not independent of one another given they were nested within county agencies, the data violated independent observation assumptions of Cox proportional hazard models and other regression-type models (Guo & Wells, 2003). If standard uncorrected Cox proportional hazard models were used to assess factors associated with the timing of permanency outcomes, biased standard errors and test statistics would

result, which could incorrectly identify some independent variables as significant when they are not (Allison, 1995; Guo & Wells, 2003; Lin, 1994).

Of the two categories of models – frailty models and marginal models – that can be used to correct for autocorrelation, the marginal model were used for this research. The marginal model does not require assumptions about the distribution of the dependence of correlated times. Furthermore, when assessing the timing of child welfare outcomes, prior research recommended using marginal models since random effects would not have substantive meaning and the correct parameter distribution of the frailty model is unknown (Guo & Wells, 2003; Lin, 1994).

In addition, while there are two types of marginal models – the LWA model (Lee, Wei, & Amato, 1992) and the WLW model (Wei, Lin, & Weissfeld, 1989) – the LWA model was selected for this research. The main difference between the models is that the WLW model is flexible in that it can have divergent baseline hazard rates, while the LWA model is used when there is a common baseline hazard rate. Because Monte Carlo studies showed that there are very small differences between results of the LWA and WLW models, using a common baseline with the LWA model is typically more plausible. The LWA marginal model by producing a robust sandwich covariance matrix, which is used for statistical testing. Although estimated coefficients are not expected to differ in size between a corrected and uncorrected Cox model, the standard errors are usually larger when using the corrected models, causing variables that would have been significant in the uncorrected model to not be significant with the corrected model (Guo & Wells, 2003). Because several research efforts have successfully used these marginal models for multivariate failure time data to assess factors associated with child welfare outcomes (Brown, 2005; Drake, Jonson-Reid, &

Sapokaite, 2006; Guo & Wells, 2003), this method was selected as the most appropriate analytical approach for this study to assess what factors might be related to achievement of timely permanency outcomes for children in foster care.

The LWA model can be expressed as the hazard function of the *i*th clustering unit (which is the county agency in this study) for the *k*th individual type of failure (which is the child in this study) as follows:

$$\lambda_k (t; Z_{ik}) = \lambda_0 (t) \exp [\beta' Z_{ik} (t)]$$

where $Z_{ik} = (Z_{1ik}, \dots, Z_{pik})'$ represents the covariate vector for the *i*th unit with respect to the *k*th type of failure, $\lambda_0 (t)$ is the common baseline hazard function, and $\beta = (\beta_1, \dots, \beta_p)'$ is a p x 1 vector of unknown regression parameters. To address the violation of independent observations, the LWA procedure estimates marginal distributions of the distinct failure times to produce a robust and optimal estimation of the variance-covariance matrix, which is then used in the statistical calculation to correct for biases in standard errors and estimate parameters (Allison, 1995; Brown, 2005; Guo & Wells, 2003).

To conduct the analysis using corrective Cox proportional hazard models, Guo and Wells (2003) recommend conducting several steps needed to assess the extent of correlation of data. Each of these steps were conducted with the study data and described in the results. First, Guo and Wells suggested identifying the proportion of children in the sample that were nested within larger groups that may cause autocorrelated data. In this study, because all children in the child welfare system in North Carolina are served within local county agencies, all of the children can be considered nested within one of the 100 county child welfare agencies. Guo and Wells also suggested obtaining intraclass correlations (ICC), by

using HLM statistical software. The ICC is the proportion of variance in the times to achieve the event that is between groups. As recommended, one of the first steps in this research involved estimating the intragroup correlation of children nested within counties, by identifying the between-group and within-group variances using the HLM software to run a one-way ANOVA with random effects model. According to Guo and Wells, a high intragroup correlation, such as a correlation greater than 0.5, indicates that a considerable proportion of the variation in timing of achieving permanency is due to being in groups, thereby suggesting that a corrective Cox proportional hazard model should be used. Furthermore, Guo and Well suggested an additional assessment strategy to evaluate the extent of autocorrelation of children within county child welfare agencies, which has been previously used as an alternative approach to assessing ICC (Allison, 1995). Cox proportional hazard models were estimated for time to each permanency outcome, where the time to permanency of an omitted case from each county was used as a predictor. The Cox models contained all main effect study covariates, as well as the additional predictor of time to permanency for the omitted cases, to assess if there was a residual autocorrelation once the effects of the other covariates had been removed. Significant results indicate a high degree of autocorrelation among children within county child welfare agencies, supporting an analytical approach of using corrected Cox models.

Despite the results of these preliminary tests to assess for the extent of autocorrelation of the data, Guo and Wells (2003) highlight that the ultimate decision to use a corrective model in the analysis depends on the researcher's judgment regarding whether the nested data should be controlled. In this research, it was important to use corrective Cox models since it was hypothesizing that county and agency characteristics are related to children's

ability to achieve timely outcomes. Furthermore, research has yet to fully explore the achievement of child welfare outcomes while controlling for children nested within county agencies, allowing the use of corrective Cox proportional hazard models for this research provided a substantial contribution to the literature and informed whether future research and performance measures should also account for autocorrelated child welfare data. Therefore, the LWA model was used for all survival models throughout this study to estimate the time to achieve each permanency outcomes which controlling for autocorrelated child welfare data. In addition, to further demonstrate the need to use a multi-level analytical approach for this study, results of the corrective Cox proportional hazard models were compared to results obtained from naïve Cox proportional hazard models.

As mentioned previously, for each permanency outcome, specifically reunification, adoption, and guardianship or custody, both main effects and cross-level interactions were evaluated. While the main effects were consistent across each type of permanency outcome, a thorough assessment strategy was used to evaluate cross-level interactions. Each cross-level interaction was tested one at a time, where the model included all main effect variables plus the addition of one cross-level interaction. Only significant interactions were retained and assessed together to see which interactions remained significant. Only the interactions that remained significant were kept in the final model along with the main effects. To interpret the results of the cross-level interactions, graphs were plotted depicting the changes in hazard rates at various levels of each covariate from the significant cross-level interactions. These graphs were generated in Excel using the parameter estimates for the covariates and the cross-level interaction to plot the hazard rates at specific intervals or values for each of the factors.

Competing Risks Analysis

A competing risks framework was also used for this study because children faced competing risks of multiple types of permanency exits from foster care. Any single type of exit excluded them from achieving any other type of exit. When multiple outcomes are possible for a survival analysis, a competing risks approach should be considered. Under this condition, separate corrective Cox proportional hazard models were defined for each type of competing outcome, called type-specific or cause-specific hazards (Allison, 1995; Hosmer, Lemeshow, & May, 2008). A separate survival model was estimated for each type of outcome to identify differences among timing to each type of event as well as differences among covariates that may have different associations with each type of outcome. For each type of permanency outcome, the model evaluated the achievement of that particular outcome and censored cases that did not achieve that outcome, since these children experienced alternative outcomes (Allison, 1995).

Only two studies have applied competing risks models to evaluate achievement of competing child welfare outcomes, and authors from both studies recommend that this approach should be used to accurately assess how children achieve different and competing child welfare outcomes (McDonald, Poertner, & Jennings, 2007; Testa & Slack, 2002). Applying a competing risks model to this research provided a valuable contribution to the field, especially since it incorporated corrective Cox proportional hazard models, which has not yet been done. Specifically, these previous child welfare studies with competing risk models used Cox regression models without accounting for the autocorrelation of child welfare administrative data with children nested within county child welfare agencies. This research used a competing risks model to assess competing permanency outcomes, while also

using corrective Cox proportional hazard models to account for children nested within counties. Therefore, this research was the first to apply both a competing risk approach with corrective Cox models to address the multiple complications of child welfare data, addressing both the autocorrelation of children nested within counties and competing permanency outcomes.

Several steps were needed to conduct a competing risks analysis and the results of each are discussed in the results section (Allison, 1995; McDonald et al., 2007). The initial step in evaluating whether there were competing risks was to obtain survivor curves for each type of permanency outcome without controlling for covariates to assess if there were significant differences in time to exit among the different types of permanency. Significant differences indicated the presences of competing risks, which supported the need for a competing risks analytical approach.

All of the following steps in the competing risk analysis were conducted three times since the competing risks part of the analysis was stratified by age group, so the analysis was conducted for infants, children ages 2 through 12, and also for adolescents ages 13 and older. All age groups assessed timely achievement of reunification, adoption, and guardianship or custody, however only adolescents were able to evaluate emancipation since this was the only age group eligible to achieve this outcome.

The first step in a competing risks analysis was to determine if testing separate corrective Cox proportional hazard models, specifically LWA models, for each type of permanency exit was best, or if all types of exits could be consolidated and treated the same. This was necessary to test the null hypothesis across all permanency types, evaluating whether all coefficients are equal across all types of exits. To do this analysis, several models

were estimated, including a model that treated all types of permanency the same and a model for each type of permanency exit that censors all other exits. To assess whether all types of permanency exits should be considered separately or assess all types of exits the same in an overall model, a likelihood ratio test was performed. To do this, the goodness of fit statistic of -2 log-likelihood was summed across each of the type-specific models, which was then subtracted from the -2 log likelihood value from the overall exit type combined model. The degrees of freedom for the likelihood ratio chi-square statistic was equal to the difference between the sum of all the degrees of freedom for all of the type specific exit models and the degrees of freedom of the exit types combined model. If the likelihood ratio chi-square statistic with aforementioned degrees of freedom was significant, then the null hypothesis was rejected, meaning that the coefficients were not equal across all event types and different predictors related differently to each permanency outcome. Once it was determined that the null hypothesis could be rejected and there were differences among the types of permanency exits, the overall fit of each of the type-specific models was assessed using model chi-squares.

After estimating LWA models for each type of permanency outcome for each of the three age groups, the last step in this research was to assess the strength of the relationship between the independent variables and each type of permanency exit. For both the competing risks analysis as well as the analysis for all ages testing main effects and cross-level interactions, the results of the LWA models provided several statistics that were used to assess the relationship of each covariate to each permanency outcome, specifically the p-value, which tested the significance level of the variable, and the hazard ratio, which captured the direction and strength of the relationship and could also serve as a measure of effect size (Allison, 1995; McDonald et al., 2007).

For this study, all hazard ratios were interpreted as an increase or decrease in the speed to achieve each type of permanency. Specifically, the hazard ratio was interpreted as the percentage in which the hazard rate or speed for achieving permanency was faster or slower for a particular subgroup of children with a given characteristic than that of a reference subgroup. This percentage was the difference between the hazard ratio and one. A hazard ratio of one meant there is no relationship, while negative relationships were identified as those ratios between zero and one, and positive relationships were identified as those ratios greater than one. Therefore, the hazard ratio identified the percentage in which characteristics were related to an increase or decrease children's timely achievement of permanency outcomes. To assess the significance of the relationships between the independent and dependent variables, the p-value was used to assess the level of significance. However, given the large sample size used in this study, covariates could be significant yet they may only have had a small effect size. Therefore, both hazard ratio and p-value from the LWA models were used to identify which factors among the characteristics of children, agencies, and counties were significantly related to achieving each permanency type.

Analytical Computer Software

Several different analytical computer software programs were used to conduct this research. Data management of the various datasets was conducted using a combination of Microsoft Excel and SAS 9.1. Several of the data sources were obtained in Excel, but were converted into SAS 9.1. Data analysis was predominately conducted with SAS 9.1. The SAS 9.1 software was used for all descriptive statistics and survival analysis models. HLM software was also used to estimate the intragroup correlations, since this estimation was not

available in SAS. Also, Excel was used to generate graphic depictions of the significant cross-level interactions.

Chapter 3: Descriptive and Preliminary Analysis and Evaluation of Local Variability

Descriptive Analysis

Sample Characteristics

The study sample included all children, from birth through age 18, who entered foster care for the first time in North Carolina from January 1, 2002 through December 31, 2005. Table I in the Appendix describes the characteristics of the study sample according to the individual, county child welfare agency, and county characteristics that were used in this research. Frequencies and percentages were reported for all characteristics measured by bivariate or categorical variables, while the mean and standard deviation were reported for characteristics measured by continuous variables. Because the study sample contained a total of 22,316 children from 100 counties within North Carolina, the maximum sample size (n) for evaluating individual-level characteristics was 22,316 and the maximum sample size for evaluating county child welfare agency characteristics or county demographics was 100. In addition, when available, data on child welfare agency and county characteristics were obtained for each of the entry cohort calendar years from 2002 through 2005, so that county-level data could be matched to the individual child based on the year they first entered foster care.

Evaluating characteristics of 22,316 children in the study sample showed that the numbers of children entering foster care for the first time in each entry cohort calendar year from 2002 through 2005 were approximately the same. Specifically, 5237 children (23.47%)

entered foster care in calendar year 2002, 5260 children (23.57%) entered in 2003, 5877 children (26.34%) entered in 2004, and 5942 children (26.63%) entered in 2005.

The mean age for children was 6.77 years old, with a standard deviation of 5.56. Approximately equal numbers of male and female children were in the sample, with 11,253 females (50.43%) and 11,063 males (49.57%). In terms of children's race, 10,837 children (48.56%) in the study sample were white, while 11,478 children (51.44%) were children of color. Only 1879 children (8.42%) were identified as having Hispanic ethnicity. Children in the study sample came into foster care for many reasons, where 17,989 children (80.61%) had neglect as a reason for placement into foster care and 2930 children (13.13%) had abuse as a reason for placement.

A total of 19,024 children (85.25%) of the study sample exited from foster care in the three-year study timeframe. The remainder of the study sample, which included 3,292 children (14.75%), did not exit foster care within the three-year study timeframe and were censored in the analysis. Among those that achieved an exit from foster care during this timeframe, the most common exit was due to reunification which was achieved for 8248 children (43.36%), followed by 5504 children (28.93%) who exited due to guardianship or custody, 3395 children (17.85%) who exited due to adoption, and 669 children (3.52%) who exited because of emancipation. Another 1208 children (6.35%) exited foster care due to a reason other than achieving a permanency outcome, such as running away from foster care or their custody was transferred to another agency.

The average number of children from the study sample in each county child welfare agency was 223.16. The mean for the overall caseload size for all children served by the

county child welfare agencies was 157.22 in calendar year 2002, 155.28 in calendar year 2003, 162.16 in calendar year 2004, and 170.56 in calendar year 2005.

The average percentage of social work positions that turnover in a calendar year for a county child welfare agency was 23.73% in calendar year 2002, 27.35% in calendar year 2003, 32.6% in calendar year 2004, and 30.43% in calendar year 2005. The average use of relative placements among county child welfare agencies was similar across all calendar years, with 24.22% in 2002, 22.99% in 2003, 24.35% in 2004, and 24.05% in 2005. The mean percentage use of non-family placements by among county child welfare agencies was 16.65% in calendar year 2002, 17.01% in calendar year 2003, 15.91% in calendar year 2004, and 14.9% in calendar year 2005.

Although all county child welfare agencies currently are engaged in implementing alternative response to child maltreatment reports, called the Multiple Response System (MRS) in North Carolina, they varied in regard to the year in which they started MRS. For the first entry cohort year in calendar year 2002, only 10 counties had implemented MRS. However, for the remainder of the three entry cohort years from 2003 through 2005, 52 counties were engaged in implementing MRS. Several county child welfare agencies also had access to family courts to assist with the legal aspects of managing foster care cases. In calendar years 2002 and 2003, 16 counties had family courts that assisted with child welfare cases, while in 2004, 17 counties and in 2005, 18 counties had family courts. Although the alternative response system and family courts can be considered reform efforts, several additional child welfare reform efforts were being implemented across the state in numerous counties. Of the 100 counties, 45 county child welfare agencies had a history of involvement with at least one child welfare reform effort.

Counties in North Carolina also varied in regard to several demographic characteristics. Specifically, the average percentage of individuals living in poverty in a county increased slightly over the four-year entry cohort period, with 14.55% in calendar year 2002, 14.62% in calendar year 2003, 15.12% in calendar year 2004, and 16.86% in calendar year 2005. The percentage of people unemployed among counties in North Carolina declined slightly over the four-year entry cohort period, with 7.18% in calendar year 2002, 6.89% in calendar year 2003, 5.94% in calendar year 2004, and 5.71% in calendar year 2005. In addition, North Carolina counties varied slightly in the number of violent crimes per 1,000 people. The average number of violent crimes per 1,000 was 3.35 in calendar year 2002, 3.19 in calendar year 2003, 3.29 in calendar year 2004, and 3.46 in calendar year 2005.

Preliminary Analysis

Before conducting multivariate analysis to begin answering the research question, preliminary analysis was conducted to adequately assess the nature of the study data. Specifically, the preliminary analysis evaluated the presence of multicollinearity among covariates, the extent of autocorrelation of children within county agencies, and the presence of competing risks among the dependent variables.

Multicollinearity

To evaluate the presence of high correlation among individual, child welfare agency, and county characteristics, multicollinearity of the independent variables was examined before conducting multivariate analysis. Specifically, correlations and variance inflation factors (VIF) were obtained to assess the extent of multicollinearity and determine if corrective actions were needed. The highest Pearson correlation coefficient of 0.758 was between county urban status and agency caseload size, which was to be expected given that

urban counties tend to have higher populations and more children in their foster care caseloads than rural counties. Additionally, all of the VIF values for the independent variables were well below the standard threshold of a VIF score of 10.

Although the VIF scores were low, the high correlation of urban status with caseload size led to the decision to omit the variable for a county urban status. Furthermore, this variable had several validity concerns. County urban status was only collected during the 2000 census, yet other county data for this study was available annually from 2002 through 2005. Additionally, with county urban status being measured at one time point for the year 2000, it could not measure changes in status over time, as was the case with the majority of the other county and child welfare agency variables measured during each of the four entry cohort years. Therefore, the decision the variable for county urban status was not included in the subsequent analysis.

Autocorrelation

One of the primary objectives of this research was to conduct analysis with multilevel methods to account for the autocorrelation of children nested within county child welfare agencies. One-way ANOVA's with random effects were used to obtain measures of between group and within group variance to calculate the intraclass correlation coefficient (ICC), which identified the proportion of variance in the outcome variables that was due to differences between counties (Raudenbush & Bryk, 2002). For time to achieve reunification, the ICC was 0.0899, indicating that 8.99% of the variance was between counties. For time to adoption, the ICC was 0.0964, meaning 9.64% of the variance was between counties. For those that achieved guardianship or custody, the ICC was 0.1161, indicating that 11.61% of the variance was between counties. Lastly, for time to emancipation, the ICC was 0.0027,

meaning that only a small percentage of 0.27% of the variance was between counties. The ICC estimates were not necessarily above the standard threshold of 0.25, which indicates the need to use multilevel methods to address autocorrelation. Although given the structure of the county-administrated child welfare system in North Carolina, where local policies, practices, and characteristics shape the experiences of children involved in foster care, it was still appropriate to evaluate the multi-level influence of both individual- and county-level characteristics on the achievement of timely permanency outcomes.

However, an additional assessment strategy was used to evaluate the extent of autocorrelation of children within county child welfare agencies, which prior research has used as an alternative approach to assess ICC (Allison, 1995; Guo & Wells, 2003). Specifically, Cox proportional hazard models were estimated for time to reunification, adoption, and guardianship or custody, where the time to permanency of an omitted case from each county was used as a predictor. The Cox models contained all main effect study covariates, as well as the additional predictor of time to permanency for the omitted cases, to assess if there was residual autocorrelation once the effects of the other covariates had been removed. Significant ($p<.001$) coefficients were obtained for the time to permanency covariates for the models testing time to adoption and time to guardianship/custody. These results indicated that there was a high degree of autocorrelation among children within county child welfare agencies, supporting the need for using a corrected Cox model for the analysis.

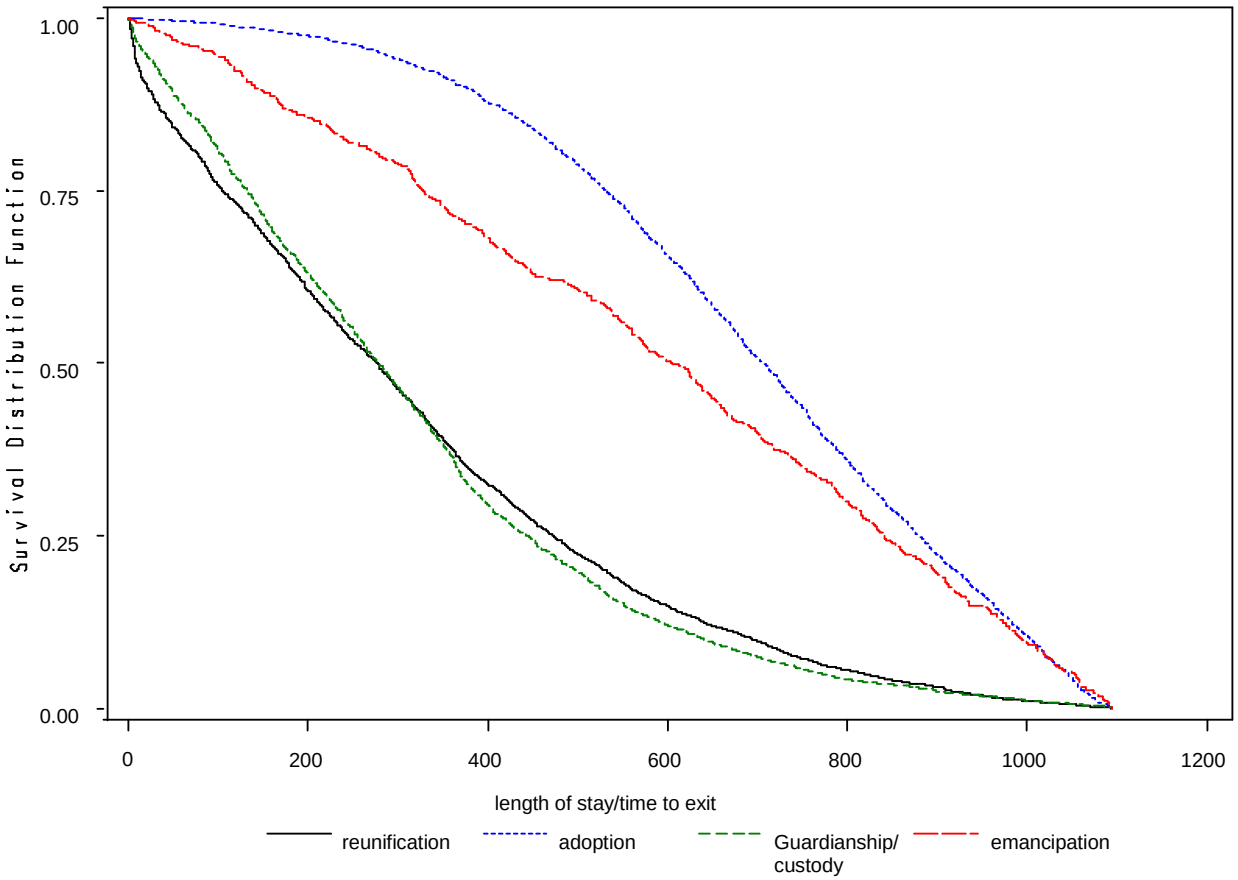
Competing Risks

A necessary step to evaluate factors related to time to achieve timely permanency outcomes was to assess whether there were differences in the time to achieve each type of

permanency exit from foster care. Figure II depicts the survivor curves for the permanency outcomes of reunification, adoption, guardianship or custody, and emancipation. The survivor curves showed that children who exited to reunification and guardianship or custody had the shortest lengths of stay in foster care, meaning they had the quickest achievement of permanency outcomes. Children who exited foster care due to adoption, however, achieved permanency at a slower rate than those who exited to other permanency outcomes.

Figure II

Survivor curve for length of time in foster care (in days) to achieve permanency



These visual results were confirmed with Kaplan-Meier estimates for the median length of time in foster care to achieve each type of permanency outcome, which are depicted

in the first row of Table II in the Appendix. For those children that exited to reunification, their median time to exit foster care was 278 days, which was very similar to the median time of 279 days for children to exit foster care due to achieving guardianship or custody. The median time for children to exit foster care due to emancipation was 605 days, and the longest median time for children to exit foster care was 707 days for those achieving adoption. These Kaplan-Meier estimates stratified by type of permanency exit were significant ($p<.0001$), indicating the need to use a competing risks evaluation strategy to assess how covariates differ in their relationship with each type of permanency outcome.

Local Variability in Achieving Timely Permanency

A primary objective of this study was to better understand how differences in local characteristics among child welfare agencies and counties may be related to timely achievement of permanency outcomes. To assess this research question, more information was needed regarding the patterns of variability of child, agency, and county characteristics and how quickly children achieve permanency outcomes under different conditions of these characteristics. Table II in the Appendix portrays Kaplan-Meier estimates for the median length of time to exit foster care and corresponding 95% confidence intervals for each permanency outcome broken down by categories of all child, agency, and county characteristics evaluated in this study. All continuous variables measuring child welfare agency and county characteristics were categorized into quartiles. Significance tests showed significant ($p<.0001$) differences in length of time to exit foster care across all characteristics and types of permanency exits.

Child Characteristics

In regard to children's age, adolescents ages 13 and above at the time of entry into foster care had the shortest median length of time to reunification of 221 days. Children ages 2 through 12 had the longest median length of time to reunification with 295 days, yet infants ages 0 through 1 were just slightly quicker with a median time of 293 days to reunification. For time to adoption, infants and adolescents surprisingly had the same median length of time in foster care of 652 days, while children ages 2 through 12 had a longer median time to adoption of 766 days. Adolescents had the shortest length of time in foster care before exiting to guardianship or custody with 266 days, followed by children ages 2 through 12 with a median time of 280 days. The longest time to guardianship or custody was for infants with a median length of stay in foster care of 287 days. Adolescents were the only age group that was old enough to emancipate from foster care and their median length of stay in care prior to aging out was 605 days.

Males and females had similar median lengths of time to exit foster care across each type of permanency outcome. Females were slightly quicker than males to achieve reunification, with females having a median length of stay in foster care of 270 days and males with 280 days before exiting to reunification. However, females were a bit slower than males to achieve adoption, with females having a median length of time in foster care of 711 days and males having a median of 704 days. Males were also slightly quicker than females to achieve guardianship or custody, since they had a median time to exit foster care of 274 days, while females had a median time of 283 days. A greater gender difference was seen for emancipation, where females aged out of care quicker with a median length of time to exit of 577 days and males had a median time of 634 days to emancipation.

Comparison of racial differences for time to achieve permanency outcomes showed that across all types of permanency exits, white children left foster care quicker than children of color. For reunification, white children had a median time to exit of 270 days, while children of color had a median time to exit of 282 days. A larger difference was seen when looking at median time to adoption, where white children had a median time of 675 days and children of color had a median time of 745 days to achieve adoption. For those exiting to guardianship or custody, white children had a median time of 274 days, while children of color had a slightly longer median time of 282 days in foster care. In regard to children who emancipated from foster care, white children had a median time to exit of 588 days and children of color had a longer median time of 623 days.

In regard to children's Hispanic ethnicity, Hispanic children had a shorter median length of time to reunification of 237 days, compared to that of non-Hispanic children who had a median time to reunification of 280 days. However, when looking at time to adoptions, Hispanic children had a slightly longer median time of 725 days compared to non-Hispanic children with a median time of 705 days. The median length of time to guardianship or custody was shorter for Hispanic children with 248 days, while non-Hispanic children had a median length of time in foster care of 280 days before achieving guardianship or custody. For those older children who emancipated from foster care, Hispanic children had a much shorter median length of stay in care with 453 days, compared to non-Hispanic children who had a median length of stay of 623.5 days.

Children who had abuse identified as a reason for placement, compared to those that did not have abuse as a reason for placement, had longer lengths of stay in foster care for all types of permanency outcomes except for emancipation. Specifically, children who had

abuse as a reason for placement had a median length of time to reunification of 289 days, while those who did not have abuse as a reason for placement had a median time of 275 days to reunification. In regard to children who were adopted, children who had abuse as a reason for placement had a median time to adoption of 745 days, compared to a median time of 704 days for children without abuse as a reason for placement. The median length of stay was 293 days for children who exited foster care to guardianship or custody and had abuse as a reason for placement, which was longer than the median time of 276 days to guardianship or custody for those without abuse as a reason for placement. Foster youth who emancipated from care and had abuse as a reason for placement the median length of stay was 537 days, which was shorter than the median time of 620 days for those who did not have abuse as a reason for placement.

A similar patter was found for children with neglect as a reason for placement into foster care, who had longer median times in care for all types of permanency exits except emancipation, compared to children who did not have neglect as a reason for placement. In particular, children with neglect as a reason for placement had a median time to reunification of 295 days, which was longer than the median time to reunification of 182 days for children without neglect as a reason for placement. Also, children with neglect as a reason for placement had a median time to adoption of 724 days, which was much longer than the median time of 571 days for children without neglect as a reason for placement. For children who exited foster care to guardianship or custody, the median time in care of 280 days for children with neglect as a reason for placement was only slightly longer than the median time of 270.5 days for children without neglect as a reason for placement. Those foster youth who had neglect as a reason for placement had a shorter median length of time to emancipation

with 575 days, compared to the median length of time of 632 days for those without neglect as a reason for placement.

County Child Welfare Agency Characteristics

To assess differences in time to achieve each type of permanency outcome according to the size of the child welfare agency foster care caseload, the measure for caseload size was categorized into quartiles, where the first quartile was 42 children or less in the county agency caseload, the second quartile was between more than 42 and up to 88 children in the caseload, the third quartile had more than 88 children and up to 185 children in the caseload, and the fourth quartile had greater than 185 children in the caseload. In regard to children exiting to reunification, the median length of time in care increased as the caseload size increased. The shortest median length of time of 204 days to reunification was for counties with the smallest caseload size in quartile one, while the longest median length of time of 313 days to reunification was for counties in the fourth quartile which had the larges caseload sizes. For children exiting to adoption, the shortest median length of time of 631 days was for children in counties that had between 42 and 88 children in their caseload, yet the longest median time to adoption was 721 days for children from counties with the largest caseload size of more than 185 children. In regard to children exiting to guardianship or custody, the shortest median length of time of 217 days was for children in counties with caseloads between 42 and 88 children, while the longest median length of time was 319 days for children from counties with the smallest caseload sizes of 42 children or less. For youths who emancipated from foster care, the shortest time in care was 574.5 days for children from counties with the largest caseloads of more than 185 children, and the longest time in care was 656 days for children from counties with the smallest caseloads of 42 children or less.

The percentage of social worker turnover in a county child welfare agency was also divided into quartiles to assess how median lengths of time to each permanency outcome vary with different levels of turnover. The first quartile was 14.3% or less social work turnover, while the second quartile was more than 14.3% up to 27% turnover. The third quartile was more than 27% up to 40% social work turnover, and the fourth quartile included counties with turnover rates above 40%. Contrary to expectations, the third quartile of turnover rates with 27% through 40% social worker turnover, which was slightly above the median turnover rate for all counties in the state, consistently had the shortest median time to achieve reunification, adoption, and guardianship or custody. For time to reunification, the quickest median time to exit was 245 days for counties in the third quartile, but the longest median time to exit to reunification was 296 days for counties in the second quartile with 14.3% through 27% turnover. Similarly, the quickest median time to adoption was 676 days for children from counties agencies in the third quartile, while the longest median time was 733 days for those from agencies in the second quartile with slightly less turnover. Also, the third quartile had the shortest median time to guardianship or custody with 262 days, while the longest median time of guardianship or custody was 301 days for children from agencies in the second quartile. Time to emancipation broke from this pattern, however, since the shortest median time to emancipation was 595 days for counties from the first quartile with the lowest turnover rates, while the longest median time was 614 days for children in county agencies in the fourth quartile with the highest turnover rates.

The percentage use of relative placements among all foster care placements for a county child welfare agency was also categorized into quartiles, with the first quartile being 17.325% or less, the second quartile being more than 17.325% up to 22.02%, the third

quartile being more than 22.02% up to 28.57%, and the fourth quartile bring more than 28.57% of placements being relative placements. The shortest median time to reunification was 251 days for children in county child welfare agencies in the fourth quartile, which were agencies with the highest use of relative placements. The longest median time to reunification was 315 days for those children from agencies in the second quartile. The quickest median time to adoption was 672.5 days for children from agencies in the first quartile with the lowest percentage use of relative placements, while the longest median time to adoption was 725.5 days for children in agencies in the third quartile, which used slightly more relative placements than the statewide median. For time to guardianship or custody, however, the shortest median time of 249 days in custody was for those that use the least amount of relative placements in the first quartile, with those in the second quartile having the longest median time of 301 days. For emancipation, the fourth quartile of agencies with the highest use of relative placements had the shortest median time to emancipation with 529 days, while the longest median time was 646 days for those in the first quartile with the lowest use of relative placements.

Quartiles were also used to assess median time to permanency in regard to the percentage use of non-family placements among all foster care placements in a county child welfare agency. The first quartile had 9.765% or fewer placements that were non-family placements, while the second quartile had more than 9.765% up to 15.72%, the third quartile with more than 15.72% up to 20.64%, and the fourth quartile with more than 20.64% of placements being non-family placements. For time to reunification, the shortest median time of 216 days was for those children from agencies in the first quartile, with the lowest use of non-family placements, while the longest median time of 293 days was for those children

from agencies using the highest rates of non-family placement. However, the shortest median time to adoption was 658 days for children from agencies using the highest rates of non-family placement, while the longest median time to adoption was 755.5 days for those in agencies from the second quartile, which had slightly lower rates of non-family placements than the median rate for the state. The shortest median time to guardianship or custody of 260 days was for children from agencies in the first quartile that used the least amount of non-family placements, but the longest median time was 289.5 days for those from counties in the third quartile. In regard to youth who emancipated from foster care, the longest median time of 653 days was for those children from agencies in the fourth quartile using the greatest amount of non-family placements, but the shortest median time to emancipation was 575 days for those from agencies in the third quartile, which used slightly more non-family placements than the statewide median.

Counties with alternative response, called MRS, implemented in their local child welfare agency consistently had longer median times to achieve permanency, which was expected given that alternative response systems divert less severe cases to an assessment track, leaving only the more severe cases to enter foster care. Specifically, the median time to reunification for those in agencies engaged in alternative response was 291 days, compared to a median time of 262 days for those from counties not yet implementing MRS. Those children exiting to adoption had a longer median time to adoption of 714 days for those from MRS counties, while those in county agencies without alternative response had a median time to adoption of 693.5 days. The median time to guardianship or reunification was 282 days for children from county agencies implementing MRS, but was slightly quicker with a median time of 277 days for those in agencies without MRS. Also, the median time to

emancipation was 623 days for those in alternative response counties, yet was only 573.5 days for children from county agencies without MRS.

Local child welfare agencies that had access to family courts in their counties were found to have a similar trend, where agencies with access to family courts had longer median times to achieve reunification, adoption, and guardianship or custody. The median time to reunification was 280 days for those in counties with family courts, yet was slightly shorter with a median of 274.5 days for those in counties without family courts. Also, children from counties with family courts had a longer median time of 726.5 days to adoption, while children from counties without family courts had a median time of 694 days. For time to guardianship or custody, the median time was 293 for those children from counties with family court and only 273 for those from counties without family courts. Children from counties with family courts did, however, have a shorter median time to emancipation with 564.5 days, while those from counties without family courts had a median time of 626 days.

Counties with a history of engaging in child welfare reform efforts also tended to have longer median times to achieve adoption, reunification, and guardianship or custody. Specifically, the median time to reunification was 280.5 days for those children from agencies with a history of reform, yet only 259 days for those from county agencies without a history of engaging in child welfare reform. Likewise, children exiting to adoption had a median time of 711 days from agencies that had a history of reform, while those from agencies without a reform history had a median time of 694 days for adoption. The median time to guardianship or custody was 281 days for those from agencies with a history of child welfare reform, but was only 273 days for those from agencies without a history of reform. Children leaving due to emancipation, however, had a median time to exit of 579 days from

agencies with a history of engaging in child welfare reform efforts, while it was much longer with a median of 658.5 days for those from agencies without a history of reform.

County Characteristics

The variable measuring the percentage of individuals living in poverty in a county was categorized into quartiles to evaluate differences in median time to permanency. The first quartile included counties with 12.60% of individuals or less living in poverty, while the second quartile was more than 12.60% up to 14.70%, the third quartile was more than 14.70% up to 17.50%, and the fourth quartile was more than 17.50% of individuals living in poverty in a county. For children who achieved reunification, the shortest median time to exit was 227 days for those in counties in the third quartile, while the longest median time to reunification of 301.5 days was for children from counties in the first quartile with the lowest levels of poverty. The longest median time to adoption was 729.5 days for those in the fourth quartile of counties with the highest levels of poverty, compared to the shortest median time to adoption of 673 days for those children from counties in the second quartile. Also, children exiting foster care to guardianship or custody had the longest median time to exit of 302 days from counties in the second quartile, yet those from counties in the third quartile had the shortest median time to exit of 251 days. For foster youth emancipating from care, the shortest median time to exit was 567 days for those in counties in the first quartile with the lowest levels of poverty, while the longest median time was 653 days for those in counties in the second quartile.

Quartiles were also used categorize the percentage of unemployed in a county to assess the median time to permanency, where the first quartile was 5.20% or less unemployment, the second quartile with more than 5.20% up to 6.30%, the third quartile with

more than 6.30% up to 7.40%, and the fourth quartile with more than 7.40% unemployment in a county. For time to reunification, adoption, and guardianship or custody, the longest median time to exit was for those counties in the first quartile with the lowest percentage of unemployment, while the shortest time to exit was for those in the fourth quartile with the highest levels of unemployment. Specifically, the shortest median time to reunification was 224 days for those children from counties in the fourth quartile, compared to the longest median time of 335 days for children from counties in the first quartile. Similarly, the shortest median time to adoption was 639 days for those in counties with the highest unemployment rates, yet the longest median time to adoption was 746 days for those in counties with the lowers unemployment rates. Also, the shortest time to guardianship or custody was 253.5 days for those from counties in the fourth quartile, with the longest median time of 311 days for those from counties in the first quartile. In regard to time to emancipation, youth from the third quartile had the shortest median time to exit of 565 days, while the longest median time was 625 for those from counties in the second quartile.

The last county characteristic evaluated was the number of violent crimes per 1,000 people in a county, which was also divided into quartiles. The first quartile had 1.79 or fewer crimes per 1,000, while the second quartile had more than 1.79 up to 2.95 crimes per 1,000, the third quartile had more than 2.95 up to 4.21 crimes per 1,000, and the fourth quartile had more than 4.21 crimes per 1,000. For time to reunification, the shortest median time to exit was 228.5 days for those children from counties in the first quartile, which had the lowest levels of violent crime, but the longest median time to reunification was 306 days for those from counties in the fourth quartile with the highest rates of violent crime. Children from counties in the second quartile had the shortest median length of time to adoption of 670.5

days, while children from counties in the fourth quartile had the longest median time of 736 days. In regard to time to custody or guardianship, the shortest median time to exit was 250 days for children from counties in the third quartile, compared to the longest median time to guardianship or custody of 293 days for those children from counties in the fourth quartile. Also, for those youth that emancipated from foster care, the shortest median time to exit was 539 days for those from counties in the first quartile with the lowest levels of crime, while the longest median time to exit was 647 days for those from counties in the third quartile.

Overview of Findings

Preliminary Analysis.

To better understand the characteristics of the study sample and to assess the nature of the data, preliminary analysis was conducted to evaluate the sample characteristics as well as the multicollinearity, autocorrelation, and presence of competing risks within the study data. Descriptive statistics of the sample characteristics revealed that 19,025 children (85.25%) of the study sample achieved some type of exit from foster care within the three-year study timeframe. Of those children that exited care, the largest percentage, 43.36%, achieved reunification, while 28.93% achieved guardianship or custody, 17.85% achieved adoption, 3.52% emancipated, and 6.35% exited by some other means, such as running away or having a transfer of agency authority. In addition, analysis of multicollinearity did not show high correlations among the majority of agency and county characteristics, however high correlation between the measure for county urban status with several variables, along with concerns about the measure's validity, led to the omission of this variable from subsequent analysis. Also, the extent of autocorrelation of children nested within county child welfare agencies was evaluated in attempt to assess the need to use corrective-Cox models in the

analysis. Although the ICC measures for each type of permanency outcome demonstrated only a moderate extent of the variance was between counties, further analysis using time to permanency of omitted cases in a Cox model revealed a high degree of autocorrelation of children within county agencies. Furthermore, differences in survivor curves and median times to achieve each type of permanency outcome demonstrated the need to conduct analysis using a competing risks framework

Local Variability

In attempt to understand how child, agency, and county characteristics differ in regard to achieving timely permanency outcomes, median times to reunification, adoption, guardianship or custody, and emancipation were estimated for each characteristic. Analysis of children's age showed that adolescents had the shortest median times to reunification and guardianship or custody. Surprisingly, adolescents had the same median time to adoption as infants. In regard to gender differences, males had shorter median times to adoption and guardianship or custody, while females had shorter median times to reunification and emancipation. A clear relationship was found in regard to race, since children of color had longer median times to achieve all types of permanency compared to white children. Hispanic children, however, had shorter median times to each type of permanency outcome, except adoption. Children with abuse and neglect as reasons for placement had longer median times to achieve each type of permanency, except for emancipation.

In addition, county child welfare agency characteristics were also used to assess differences in median times to achieve permanency outcomes. Evaluation of child welfare agency characteristics demonstrated that median times to reunification increased as the caseload size increased. The longest median time to adoption was for children from agencies

with the largest caseloads, yet the longest median times to guardianship or custody and emancipation was for children from agencies with the smallest caseloads. In regard to social work staff turnover in child welfare agencies, results showed that children from county agencies with slightly less than the median rate of turnover, which comprised the second quartile, had the longest median times to reunification, adoption, and guardianship or custody. However, children from county agencies from the third quartile, with slightly more than the median rate of turnover, had the shortest times to reunification, adoption, and guardianship or custody. For emancipation the shortest median time was for children from agencies with the lowest turnover, while the longest median time was for children from agencies with the highest turnover. In regard to agency use of relative placement, results showed that children from agencies with the highest use of relative placement, represented as the fourth quartile, had the shortest median times to reunification, but children from agencies with the lowest use of relative placement had the shortest time to adoption and guardianship or custody. When evaluating agency use of non-family placement, such as group homes and institutions, results showed that for children from agencies with the lowest use of non-family settings had the shortest median time to reunification and guardianship or custody. Contrary to expectations, however, children from agencies with the greatest use of non-family placement had the shortest median time to adoption. Also, children from agencies with the greatest use of non-family placement had the longest time to achieve emancipation. When assessing agency use of alternative response, results showed that children from agencies engaged in alternative response had longer median times to achieve all permanency outcomes, which was to be expected given that alternative response diverts children who are less severe, while only the most in-need cases enter into foster care. In addition, children from agencies that had access

to a local family court had longer median times to reunification, adoption, and guardianship or custody, but a shorter median time to emancipation. Similarly, children from agencies that had a history of child welfare reform had longer median times to reunification, adoption, and guardianship or custody with shorter median times to emancipation.

County characteristics were also evaluated in regard to differences in median time to achieve permanency outcomes. Results showed that children from counties with the lowest poverty rates had the longest median time to reunification, while children from counties that were slightly above the median poverty rate, categorized as the third quartile, had the shortest median times to reunification. For achieving adoption, however, children from counties with the highest poverty rates had the longest median time to adoption, but children from counties in the second quartile, having slightly less than the median poverty rate, had the shortest median time to adoption. The longest median time to guardianship or custody was found to be for children from counties with slightly less than the median poverty rate, but children from counties with slightly more than the median poverty rate had the shortest median time to guardianship or custody. Also, children who emancipated had the shortest median time in counties with the lowest poverty rates. In regard to county unemployment rates, children from counties with the lowest unemployment rates had the longest median times to reunification, adoption, and guardianship or custody, while children from the counties with the highest levels of unemployment had the shortest median times to reunification, adoption, and guardianship or custody. Lastly, in regard to the number of violent crimes per 1,000 people in a county, children from counties with the highest violent crime rates had the longest median time to reunification, adoption, and guardianship or custody. The shortest

median times to reunification and emancipation were for children from counties with the lowest crime rates.

Implications for Multivariate Analysis

The results of the preliminary analysis provided necessary insight to select the most appropriate analytical strategies for evaluating the relationship of child, agency, and county characteristics in regard to achieving timely permanency outcomes. Specifically, the assessment of autocorrelation highlighted the need to control for children nested within local county child welfare agencies. Therefore, Corrective-Cox proportional hazard models, particularly the LWA model, were required to accurately assess the relationship of covariates in regard to achieving timely permanency outcomes. Also, the identified differences among time to achieve each type of permanency outcome emphasized the need apply the corrective-Cox models within a competing risks analytical framework. This competing risks approach allowed for the simultaneous comparison of covariates across each competing permanency type.

Furthermore, evaluating the sample characteristics and comparing the median times to each type of permanency exit across child, agency, and county characteristics demonstrated the need to account for individual as well as agency and county contextual differences when evaluating timeliness to achieve permanency outcomes. Significant differences across all characteristics and types of exit reaffirmed the notion that children have different experiences and lengths of time in foster care depending on their own characteristics and the conditions of their surrounding environment, which included the policies and practices of the child welfare agency itself and the overall county demographics. Therefore, adequate evidence was provided to support the need to include child, agency, and

county characteristics in a corrective-Cox multivariate model to accurately evaluate how each characteristic, at the child and county levels, related to achieving timely permanency outcomes.

Chapter 4: Multilevel Analysis of Time to Achieve Permanency

The preliminary results and analysis of local variability demonstrated the need to use a multivariate, multilevel survival analysis approach to accurately evaluate how child, agency, and county factors related to children's achievement of timely permanency outcomes. Specifically, this study employed LWA corrective-Cox proportional hazards models to control for children nested within county child welfare agencies when evaluating how multilevel factors related to the length of time for achievement of reunification, adoption, and guardianship or custody.

Time to Reunification

Information from a total of 21,913 children were used to evaluate time to reunification, where 8,086 children (36.90%) achieved reunification within the three-year study timeframe and 13,827 children (63.10%) were censored, due to achieving another type of exit from foster care, not leaving foster care within the study timeframe, or having missing data for characteristics used in the model. Separate LWA corrective-Cox models were used to assess main effects as well as cross-level interactions. Table III in the Appendix depicts the results from Model 1, which evaluated the main effects, and Model 2, which was the final model evaluating the relationship of main effects and cross-level interactions for time to reunification. The Wald chi-square tests for both models were significant ($p<.0001$), indicating that the null hypothesis, that each coefficient is equal to zero, could be rejected.

The results of Model 1 showed that several main effects from each of the categories of individual, agency, and county characteristics were significantly related to timely

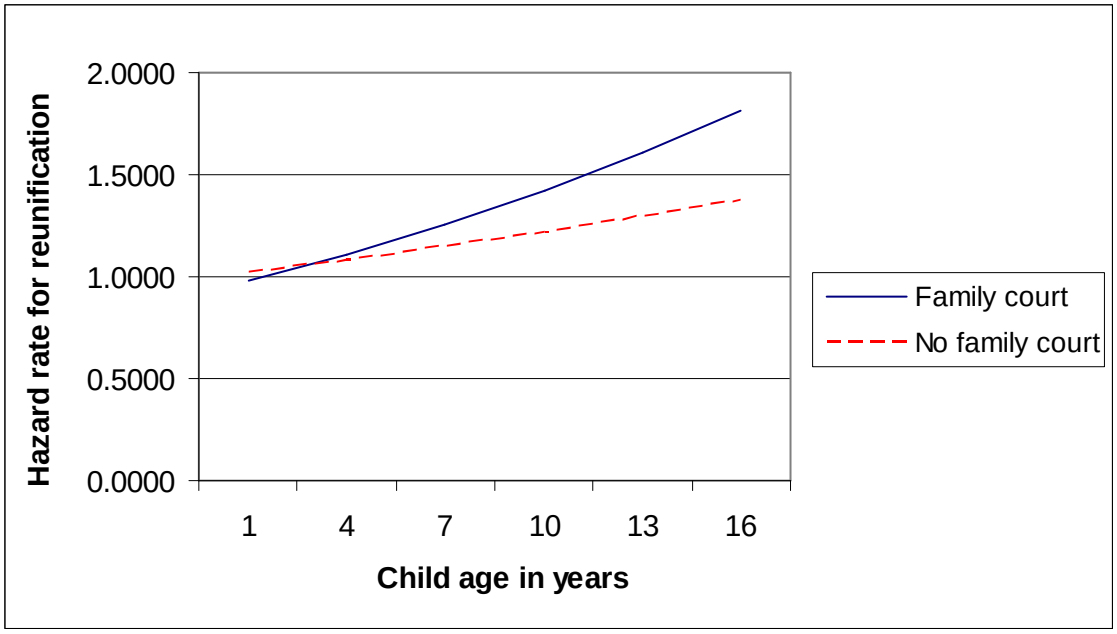
reunification. In regard to child characteristics, child age, gender, Hispanic ethnicity, and having neglect as a reason for placement were significantly related to timely reunification. Specifically, the child's age at entry was highly significant ($p<.0001$) with a hazard of 1.027, meaning that for each one year increase in age, the child achieved reunification 2.7% faster. Also, gender was significant ($p<.05$), with a hazard ratio of 0.959, indicating that compared to males, females achieved reunification at a rate that was 4.1% slower. Hispanic ethnicity was also significant ($p<.0001$) with a hazard ratio of 1.512, which means that children with Hispanic ethnicity achieved reunification 51.2% faster than those who were not Hispanic. In addition, children with neglect as a reason for placement into foster care had a significant ($p<.0001$) hazard ratio of 0.811, indicating that children who had been neglected and placed into foster care achieved reunification at a rate that was 18.9% slower than that for children who did not have neglect as a reason for placement. Two child welfare agency characteristics were also found to be significantly related to reunification. The number of children in the foster care caseload, which was measured in units of 100, was significant ($p<.01$) with a hazard ratio of 0.96, which means that for every increase in 100 children in an agency's foster care caseload, the speed of reunification slowed by 4%. In other words, for every additional child in the foster care caseload, the speed of reunification was 0.04% slower. Additionally, the hazard ratio of 1.008 for use of relative placements was also significant ($p<.05$), indicating that for every one-percent increase in an agency's use of relative placements, the speed of reunification was 0.8% faster. One county characteristic, unemployment, was significantly ($p<.05$) related to reunification with a hazard ratio of 1.052, so for every one-percent increase in unemployment in a county, the speed of reunification was 5.2% faster.

Additional analysis was conducted to assess for potential significant cross-level interactions between child characteristics of age, race, and ethnicity with each of the agency and county characteristics. The final model of main effects with cross-level interactions is depicted as Model 2 in Table III in the Appendix. Three interactions were found to be significant when tested individually with the characteristics used in the main effects model, namely the interaction of child age and agency caseload size, the interaction of child age and agency access to family courts, and the interaction of child age and county crime rates. After all three of theses interactions were tested simultaneously, only one cross-level interaction, the interaction of child age at entry and whether the child welfare agency had access to a family court, remained significant and was used in conjunction with the main effects in the final model. All of the main effects that were significant in Model 1 remained significant in Model 2 with almost identical hazard ratios when testing them with the cross-level interaction. In particular, child age at entry was significant ($p<.0001$) with a hazard ratio of 1.02, meaning that with every one-year increase in age at entry, the child's speed of achieving reunification became 2% quicker. Also, child gender was significant ($p<.05$) with a hazard ratio of 0.96, indicating that females had a 4% slower speed of reunification compared to that of males. The hazard ratio for child's Hispanic ethnicity was 1.506 and highly significant ($p<.0001$), which indicated that the speed of reunification was 50.6% faster for Hispanic children than that for non-Hispanic children. Also, neglect as a reason for placement was also significant ($p<.0001$) with a hazard ratio of 0.811, meaning that children with neglect as a reason for why they entered foster care had a speed of reunification that was 18.9% slower than that for those without neglect as a reason for placement. In addition to child characteristics that were significant, a few child welfare agency characteristics and a

county characteristic were also significant. Specifically, the size of the child welfare agency caseload was significant ($p<.01$) with a hazard ratio of 0.96, indicating that with each 100 additional children in the foster care caseload, the speed of reunification slowed by 4%. Also, the agency use of relative placements had a hazard ratio of 1.008 ($p<.05$), meaning that with every one-percent increase in the use of relative placements, the speed of reunification became 0.8% quicker. The county unemployment rate was also significant ($p<.05$) with a hazard ratio of 1.052, which indicates that with each one-percent increase in unemployment in a county, the speed of reunification became 5.2% faster. Additionally, the interaction of child age at entry and whether the child welfare agency had access to a family court was significant ($p<.001$) with a hazard of 1.022, which reflected the degree to which family court availability influenced the relationship between child age and likelihood of reunification. To depict this relationship, Figure III below shows hazard rates, or speed of reunification, for different ages at time of entry for both county child welfare agencies that have family courts and those agencies that do not. While both hazard rates for children who enter care at age one were similar, as children's age increased at time of entry, the hazard rate for reunification gradually increased. However, the hazard rate for children in agencies with family courts increased more quickly than that for children in agencies without access to a family court.

Figure III

The interaction of child age and availability of family courts on hazard rate for reunification



Time to Adoption

The LWA models to assess time to adoption used information from a total of 21,913 children, where 3,350 children (15.29%) achieved adoption within the three-year study timeframe. The results from the corrective-Cox models for time to adoption are depicted in Table IV in the Appendix, which include Model 1, testing the main effects, and Model 2, testing both main effects and cross-level interactions. The Wald chi-square tests for both LWA models were significant ($p<.0001$), indicating that the null hypothesis can be rejected and that each coefficient is not equal to zero.

Results from Model 1, which tested only main effects, showed that most of the child characteristics and one each of the agency and county characteristics were found to be significantly related to timely adoptions. Specifically, age at entry was highly significant ($p<.0001$) with a hazard ratio of 0.842, indicating that for each one year increase in age at

entry, the speed to achieve adoption slowed 15.8%. Gender was also significant ($p<.05$) with a hazard ratio of 1.076, meaning that females achieved adoption at a speed that 7.6% faster than that for males. In addition, child's race was also significant ($p<.0001$) with a hazard ratio of 0.644, which indicated that children of color achieved adoption at a speed that was 35.6% slower than that of white children. Both abuse and neglect as reasons the child was placed into foster care were also significant. In particular, the hazard ratio for abuse as a reason for placement was 0.728 ($p<.01$) and the hazard ratio for neglect as a reason for placement was 0.731 ($p<.001$). These hazard rates can be interpreted as those children with abuse as a reason for placement had a speed of adoption that was 27.2% slower than that for those without abuse as a reason for placement, while children with neglect as a reason for placement had a speed of adoption that was 26.9% slower than that for children without neglect as a reason for placement. Also, agency history of reform was significant ($p<.01$) with a hazard ratio of 1.441, meaning that children in agencies with a history of engaging in reform efforts had a 44.1% faster rate of adoption than children from child welfare agencies without a history of reform. County poverty was also significant ($p<.05$) with a hazard ratio of 0.967, indicating that with each one-percent increase of individuals living in poverty in a county, the rate of adoption slowed by 3.3%.

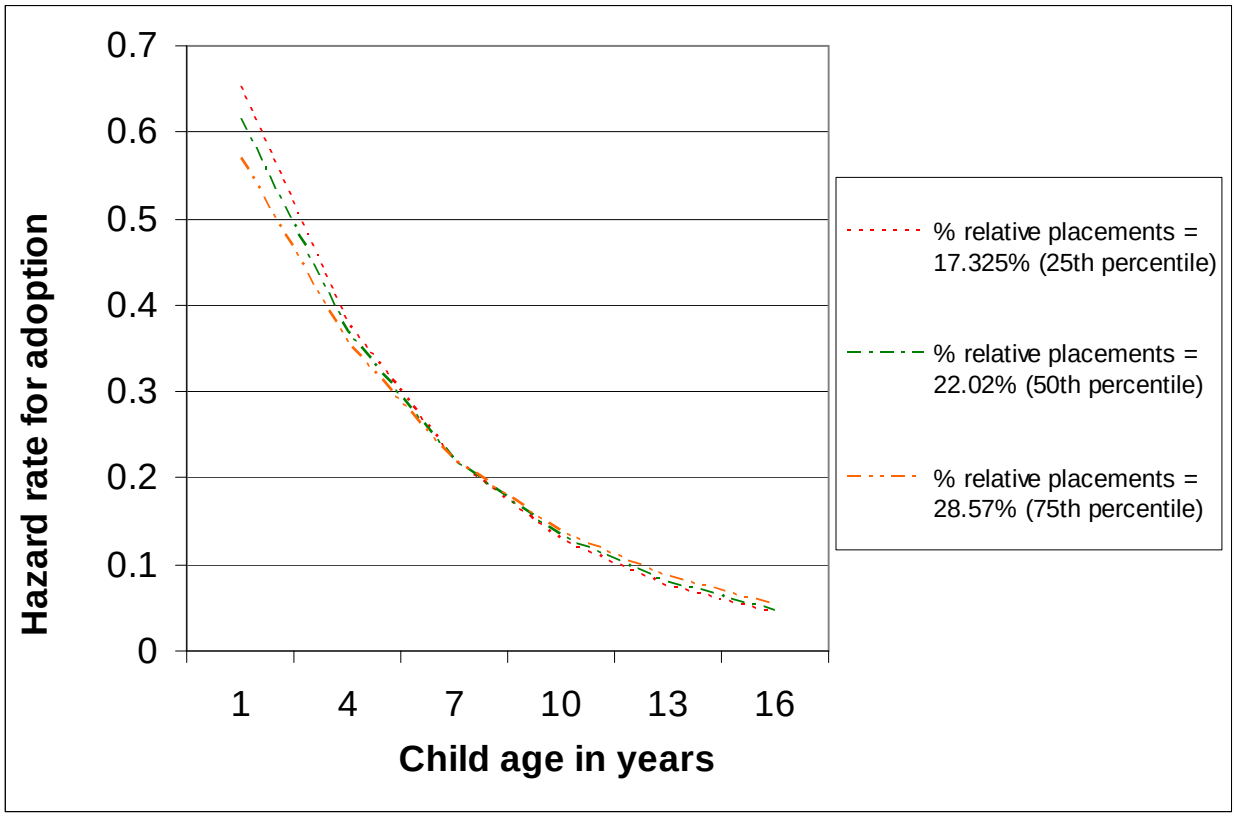
When testing for cross-levels interactions between child age, race, and ethnicity and all agency and county characteristics, only two interactions were significantly related to timely adoption when tested individually, specifically the interaction of child age and agency use of relative placement and the interaction of child race and agency access to a family court.. These two interactions also remained significant when tested jointly with all main effects, and the results of this final model are shown in Table IV as Model 2. Most of the

main effects hazard ratios were similar to those findings from Model 1, however the addition of the cross-level interactions resulted in an additional significant variable regarding agency use of relative placements. Specifically, the child's age at entry was highly significant ($p<.0001$) with a hazard of 0.806, meaning that with each one year increase in age at entry, the speed of adoption slowed by 19.4%. Gender was also significant ($p<.05$) where the hazard ratio for females was 1.074, which indicated that females had a speed of achieving adoption that was 7.4% faster than that for males. Also, child race was highly significant ($p<.001$) with a hazard of 0.704, meaning that children of color had a speed of adoption that was 29.6% slower than that of white children. The reasons for placement being abuse or neglect were both significant with hazard ratios of 0.728 ($p<.01$) and 0.736 ($p<.001$) respectively. These results indicate that children with abuse as a reason for placement had a speed of adoption that was 27.2% slower than that for children who did not have abuse as a reason for placement, and children with neglect as a reason for placement had a speed of adoption that were 26.4% slower than that for children who did not have neglect as a reason for placement. Also, two child welfare agency characteristics were found to be significantly related to timely adoption. In particular, agency use of relative placements had a significant ($p<.05$) hazard ratio of 0.986, meaning that with every one-percent increase in the use of relative placements, the speed of adoption slowed by 1.4%. Also, agency history of engaging in reform was significant ($p<.01$) with a hazard ratio of 1.411, indicating that children from agencies with a history of child welfare reform had a speed of adoption that was 41.1% faster than that of children from agencies not engaged in reform. The county variable for the percent of individuals living in poverty was also significant ($p<.05$) with a hazard ratio of 0.966, meaning that for every one-percent increase in poverty, the speed of achieving

adoption slowed by 3.4%. The interaction of child age at entry and agency use of relative placement was significant ($p<.01$) with a hazard ratio of 1.002. Figure IV graphically depicts this relationship with a hazard rate, or speed of adoption, for different levels of agency use of relative placement at several age intervals. Although all levels of usage of relative placement showed a decrease in the hazard rate as child age at entry gets older, close examination showed that lower use of relative placement had greater hazards for adoption than higher levels of relative placement while the child's age at entry was younger, when the child was approximately 7 years old or younger.

Figure IV

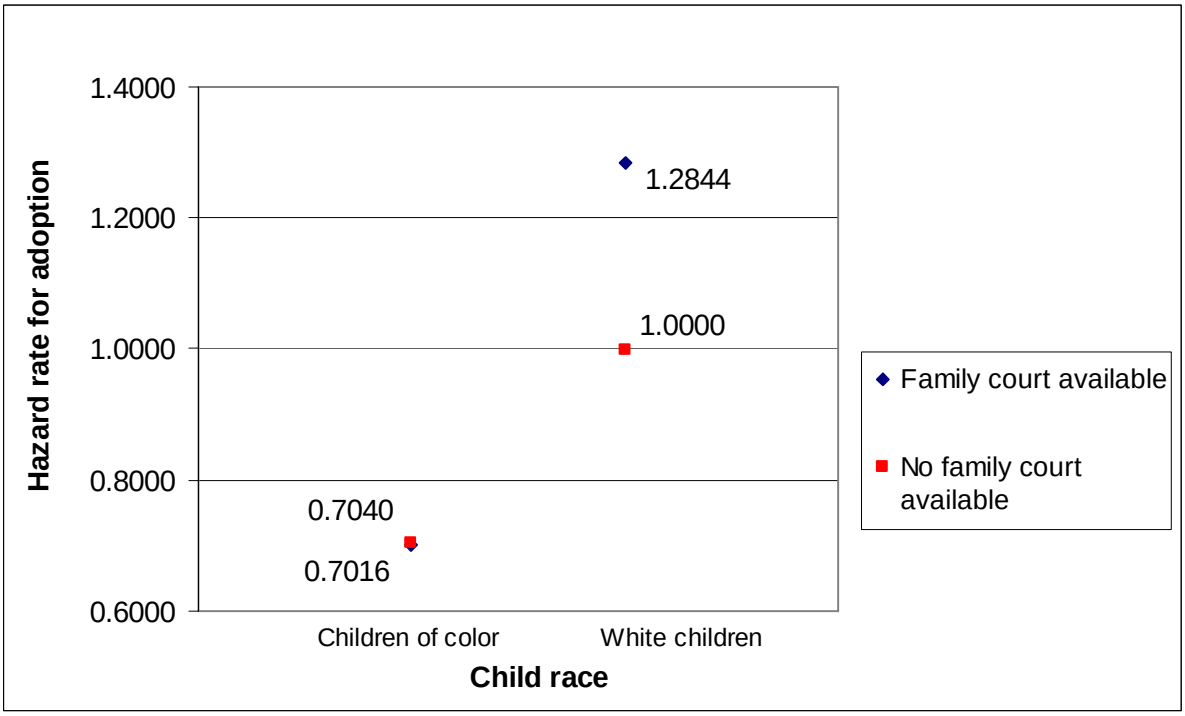
The interaction of child age and agency use of relative placement on hazard rate for adoption



The other significant ($p<.05$) interaction for timely adoption was child's race and the child welfare agency's access to a family court, which is depicted in the graph in Figure V. This interaction revealed that children of different races had differing experiences in achieving timely adoptions depending on whether they had access to family courts. In general, children of color had slower speeds of adoption compared to that of white children. In regard to family court availability, children of color had similar hazards or speeds for adoption regardless of family court availability. White children, however, showed a large difference depending on whether the child was from an agency with access to a family court. Specifically, white children with access to family courts had a much faster speed or hazard for adoption, compared to that for white children who did not have access to family courts.

Figure V

The interaction of child race and agency availability of family courts on hazard rate for adoption



Time to Guardianship or Custody

Information from a total of 21,913 children was used to evaluate time to guardianship or custody, where 5,408 children (24.68%) achieved reunification within the three-year study timeframe. The results for the corrective Cox models for time to guardianship or custody are portrayed in Table V in the Appendix, where Model 1 shows the results from testing only the main effects and Model 2 shows the results from the final model testing both main effects and cross-level interactions. The Wald chi-square tests for both models were significant ($p<.0001$) meaning that the null hypothesis, that all coefficients are equal to zero, can be rejected.

For Model 1, which tested only the main effects, only one characteristic was significantly related to time to guardianship or custody. Specifically, county poverty was significant ($p<.001$) with a hazard ratio of 1.031, indicating that with each one-percent increase in poverty in a county, the speed of achieving guardianship or custody became faster by 3.1%.

Several additional characteristics were identified as significantly related to timely guardianship and custody after testing cross-level interactions. Specifically, the number of children in the agency caseload was significant ($p<.05$) with a hazard ratio of 0.958, meaning with each increase of 100 children in the caseload, the speed of guardianship or custody slowed by 4.2%. Also, whether the agency was engaged in alternative response was significant ($p<.05$) with a hazard ratio of 0.789, indicating that children from agencies implementing alternative response efforts had a speed of guardianship or custody that was 21.1% slower than that of children from agencies that did not yet have alternative response. Also, as in Model 1, the county poverty rate was also significant ($p<.001$) with a hazard of

1.032, meaning that for each one-percent increase in poverty in a county, the speed of guardianship or custody became faster by 3.2%. A total of four cross-level interactions were identified as significant when tested individually with the main effects, specifically the interaction of child age and agency caseload size, the interaction of child age and agency use of non-family placement, the interaction of child age and agency engagement in alternative response, and the interaction of child age and agency history of reform. However, only three of these interactions remained significant when jointly tested with the main effects and were therefore included in the final model, namely the interactions of age and agency caseload size (HR=1.002, p<.001), the interaction of age and agency use of non-family placement (HR=0.999, p<.01), and the interaction of age and agency engagement in alternative response (HR=1.016, p<.05). These interactions were graphically depicted to interpret these relationships in regard to achieving guardianship or custody. Figure VI shows the interaction of child age and agency caseload, where the hazard or speed of achieving guardianship or custody was plotted for three different quartiles of caseload size at several intervals of child age at entry. While the hazard gradually increased as age increased for each of the quartiles of caseload size, children from agencies with higher caseloads had lower hazards compared to those of children from agencies with smaller caseloads. Also, the point at which the hazard went from below 1.0 to above, indicating a switch from a decrease in hazard to an increase in hazard, varied according to the size of the agency caseload, with agencies having smaller caseloads having an increasing hazard at a much earlier age than agencies having larger caseloads.

Figure VI

The interaction of child age and agency caseload size on hazard rate for guardianship/custody

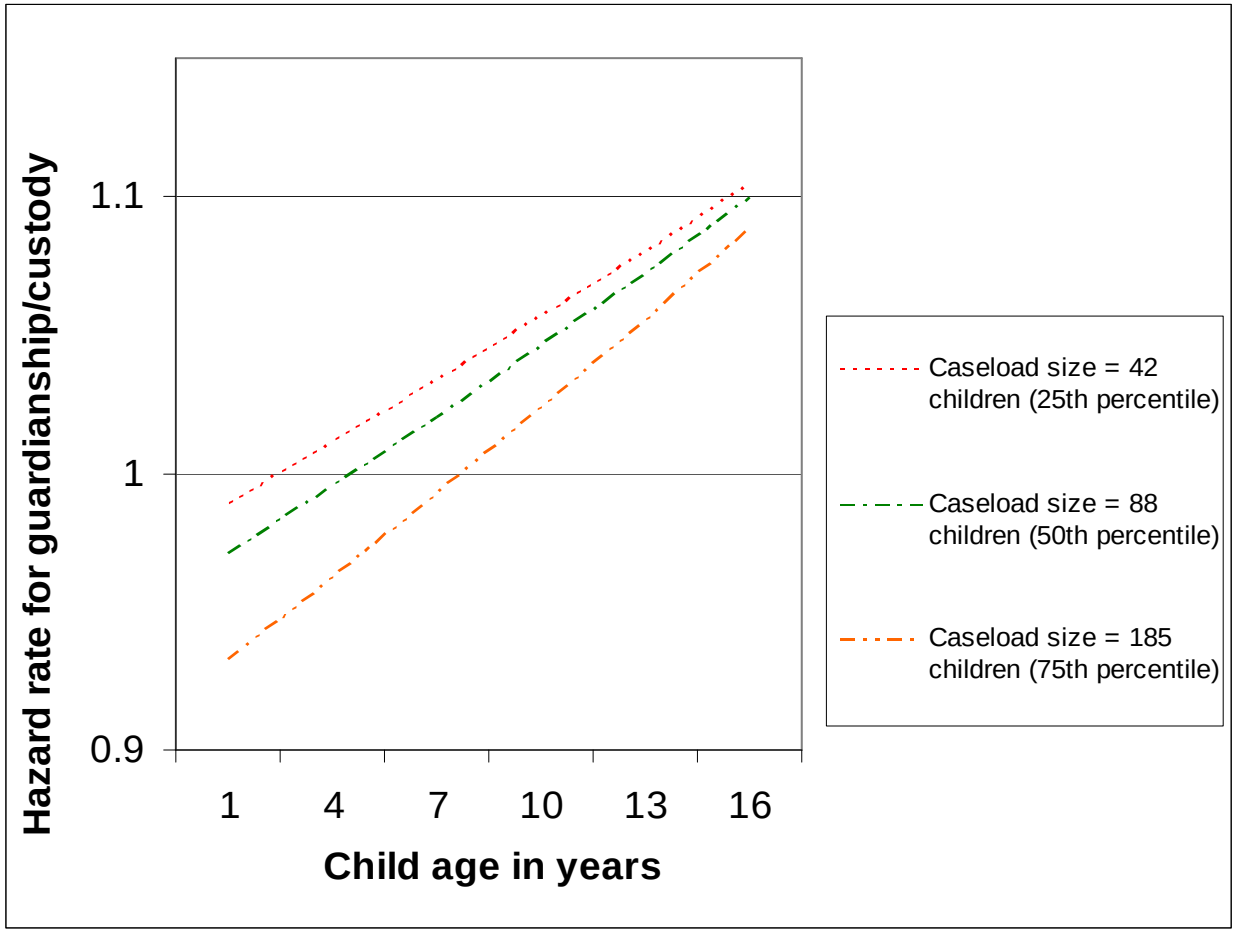
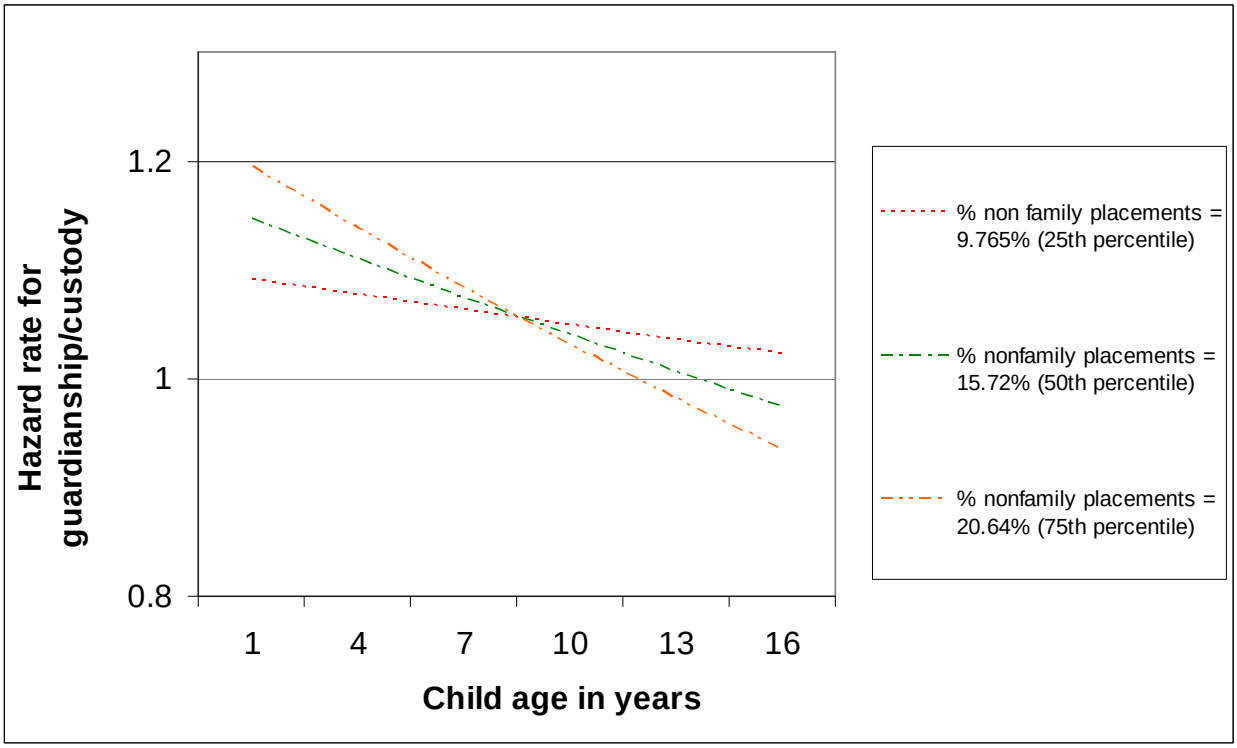


Figure VII depicts the interaction of child age and agency use of non-family placements, where hazards of guardianship or custody were plotted for different levels of agency use of nonfamily placements at several intervals of children's age at entry. The hazard for guardianship or custody was greater for younger children and declined as age increased, but the dynamics of the agency use of non-family placements differed whether the child was younger or older. Specifically, the graphic shows the hazard for guardianship or custody was greatest for younger children who were approximately 8 years of age and

younger and from agencies with the greatest use of non-family placements. However, for children ages 8 and older, the hazard was greatest for children from agencies with the lowest use of non-family placements.

Figure VII

The interaction of child age and agency use of non-family placement on hazard rate for guardianship/custody

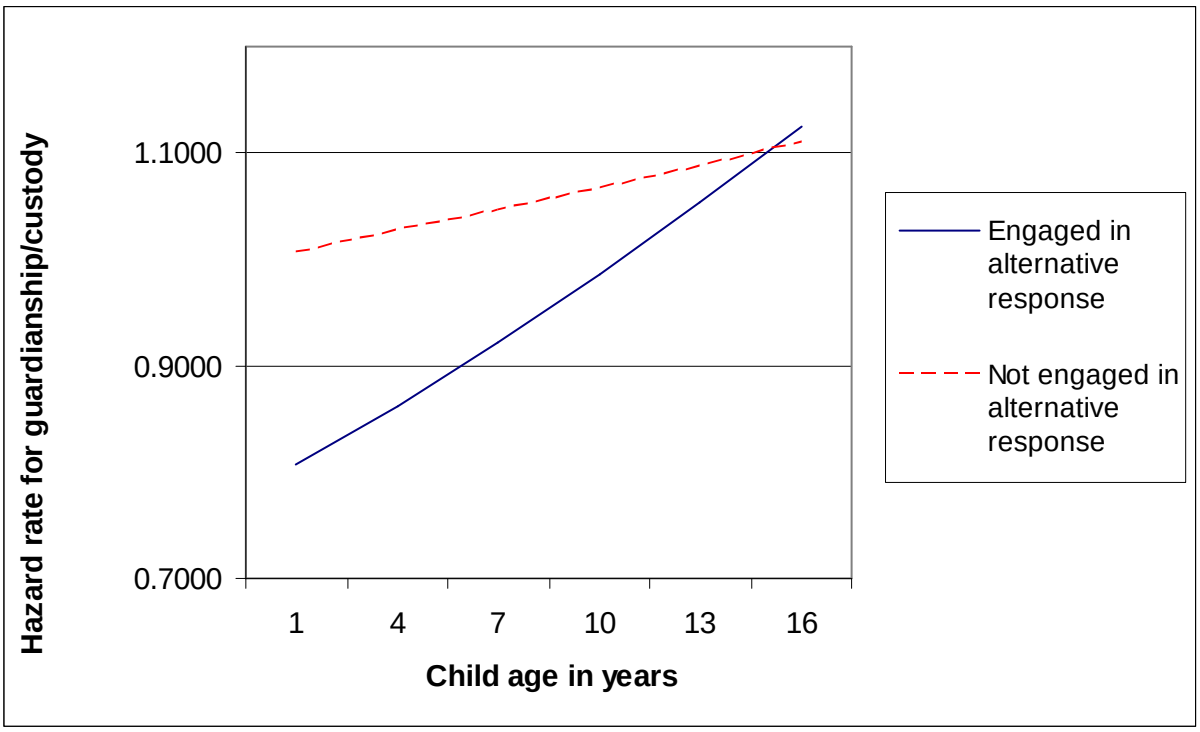


The last significant interaction of child age and agency engagement in alternative response is depicted in Figure VIII, with the hazard for guardianship or custody plotted at several ages at time of entry for both agencies engaged in alternative response and agencies not engaged in alternative response. While the hazards were very similar for both types of county agencies for older children around age 16, at younger ages there was an obvious difference in that children from agencies engaged in alternative response had lower hazards

of guardianship or custody compared to that of children from agencies not engaged in alternative response.

Figure VIII

The interaction of child age and agency engagement in alternative response on hazard rate for guardianship/custody



Comparing Naïve versus Corrective Cox Models

To further evaluate the need to apply multilevel methods of corrective Cox models when analyzing outcomes of children nested within county child welfare agencies, a comparative analysis was conducted to testing difference in results from standard naïve Cox models versus corrective Cox model. Three naïve Cox models, which did not control for the nested nature of the data, were estimated to assess the relationship of the main effects for time to reunification, adoption, and guardianship/custody. The results of both the naïve and corrective Cox models are depicted for all main effect coefficients for each type of

permanency outcome in Table VI in the Appendix. Although the parameter estimates and hazard ratios were identical for both the naïve and corrected Cox models, there were many differences in the p-values that assessed levels of significance for covariates between the two types of models.

For time to reunification, the naïve Cox model had the same significance levels for three of the seven covariates that were identified as significant with the corrective Cox model, specifically child's age at entry, Hispanic ethnicity, and neglect as a reason for placement, which all had levels of significance where $p<.001$. Another three of the seven covariates that were significant with the corrective Cox model, were shown to have increased levels of significance with the naïve Cox model. In particular, agency caseload size increased in significance from $p<.01$ to $p<.0001$, and both agency use of relative placement and county unemployment had their level of significance increased from $p<.05$ with the corrective Cox model to $p<.0001$ with the naïve Cox model. Unfortunately, one covariate, gender, was found to be significant ($p<.05$) with the corrective Cox model, yet failed to achieve significance with the naïve model. Even more concerning was that five additional covariates that were not found to be significant with the corrective Cox model, were identified as significant with the naïve model, specifically child race ($p<.05$), abuse as reason for placement ($p<.01$), agency engagement in alternative response ($p<.01$), agency with access to family court ($p<.001$), and county crime rates per 1,000 ($p<.01$).

When evaluating both Cox models for time to adoption, three of the seven covariates found to be significant with the corrective Cox model were also shown to have the same levels of significance with the naïve Cox model. Specifically, the significance levels for child age at entry ($p<.0001$), gender ($p<.05$), and race ($p<.0001$) were consistent across models.

However, four of the seven significant covariates from the corrective Cox model were shown to have increased levels of significance with the naïve model. In particular, abuse as reason for placement had a significance level of $p<.01$ with the corrective Cox model but showed a significance level of $p<.0001$ with the naïve model, while neglect as a reason for placement increased from a significance level of $p<.001$ to $p<.0001$ with the naïve model. Agency history of reform had a significance level of $p<.01$ with the corrective Cox model but increased to a significance level of $p<.0001$ with the naïve model. Also, county poverty had an increased significance level from $p<.05$ to $p<.0001$ with the naïve model. Furthermore, five additional covariates were identified as significant with the naïve model, but the corrective model demonstrated they were not significant, including agency caseload ($p<.01$), agency use of relative placement ($p<.01$), agency engage in alternative response ($p<.0001$), county unemployment ($p<.0001$), and county crime ($p<.05$).

Lastly, the model for achieving guardianship and custody had many differences between the corrective and naïve Cox models. The one covariate that was significant in the corrective Cox model, county poverty, with a significance level of $p<.001$, had an increased level of significance at the $p<.0001$ level with the naïve model. Moreover, six additional covariates that were not found to be significant with the corrective Cox model, were identified as significant with the naïve model. Specifically, child race ($p<.05$), Hispanic ethnicity ($p<.01$), neglect as a reason for placement ($p<.05$), agency caseload size ($p<.0001$), agency use of relative placement ($p<.0001$), and agency engaged in alternative response ($p<.0001$) were all found to be significant with the naïve model.

These results provided substantial evidence demonstrating the need to apply corrective Cox models when conducting analysis with nested data, particularly child welfare

data where children are nested within local child welfare agencies. A naïve Cox model operated with the assumption that event data was independent, but this assumption was violated since the children were nested within local agencies. The primary consequence of applying a naïve Cox model analytical approach to non-independent nested data was that the significance tests were biased (Guo & Wells, 2003; Wei et al., 1989). This comparative analysis provided supportive evidence of the drastic result of applying inappropriate methods and obtaining biased significance tests. Although a few covariates retained the at same level of significance with both types of Cox models, several covariates had an increase in their level of significance when using a naïve model opposed to a corrective model. Furthermore, one covariate that was significant with the corrective Cox model, failed to achieve significance with the naive model, and many covariates were erroneously shown to be significant with the naïve model when the corrective model demonstrated that they should not have significance. The application of a naïve model to nested data can contribute to false conclusions about the strength of the significance of a relationship between a covariate and an outcome, which can lead to dangerous consequences when research results are used to inform policy and practice decisions.

Overview of Findings

Reunification

Using Corrective-Cox models to evaluate the relationship of child, agency, and county covariates in regard to achieving timely reunification identified several significant characteristics, which contributed to the understanding of how these factors influence the speed of reunification. In particular, the speed of reunification increased as children's age at entry became older, and Hispanic children achieve reunification over 50% faster than that of

non-Hispanic children. Females achieved reunification slightly slower than males, and children with neglect as a reason for placement achieved reunification at a slower speed than those without neglect as a reason for placement. Also, as agency caseload size increased, the speed of reunification slightly decreased, but agencies with increased use of relative placement had increased speeds of reunification. In addition, as county unemployment increased, the speed of reunification became faster. A significant cross-level interaction of child age and agency access to a family court, revealed that although the speed of reunification generally increased as age at entry increased, the availability of a family court was related to a slower rate of increase in reunification speed compared to those from agencies without family courts.

Adoption

Several child, agency, and county characteristics were also significantly related to timely adoptions. Specifically, as child age at entry increased, their speed to achieve adoption decreased. Females achieved adoption slightly faster than males. Children of color achieved adoption at a slower rate than that of white children. Children having either abuse or neglect as a reason for placement had a slower speed for achieving adoption compared to children without abuse or neglect as a reason for placement. Although only identified as significant in the final model including cross-level interactions, as child welfare agencies increased their use of relative placement, the speed to adoption decreased. However, if an agency had a history of engaging in child welfare reform efforts, the speed of achieving adoption greatly increased. In addition, as county poverty rate increased, the speed to achieve adoption became slightly slower. Also, two cross-level interactions were significantly related to timely adoptions, including the interaction of child age at entry and agency use of relative placement

and the interaction of child race and agency access to family courts. Specifically, for the interaction of age and relative placements, the speed of adoption gradually declined with age at entry, but the influence of agency use of relative placement was different for younger children, those younger than approximately 7 years old, than it was for older children, those approximately age 7 and above. For younger children, the speed to adoption was slightly faster for those from agencies with lower use of relative placement, but for older children, the speed to adoption was slightly quicker for those from agencies with higher use of relative placement. In addition, for the interaction of child race and agency access to family court, children of color had similar speeds of achieving adoption regardless of access to family courts, but for white children, those from agencies with access to family courts had faster speeds of adoption.

Guardianship or Custody

Compared to the findings from evaluating timely reunification and adoption, fewer characteristics were significantly related to timely guardianship or custody. Specifically, no child characteristics were found to be significantly related to achievement of guardianship or custody. However, county poverty was significantly related in that the speed to achieve guardianship or custody increased as county poverty rates increased. Although only identified as significant in Model 2 when testing cross-level interactions, agency caseload size and agency involvement in alternative response were also significantly related to timely achievement of guardianship or custody. As caseload size increased, the speed to achieve guardianship or custody slowed. Also, children from agencies implementing alternative response had slower speeds of achieving guardianship or custody. Three significant interactions were found to be related to timely guardianship or custody. Specifically the

interaction of child age at entry and agency caseload size demonstrated that as child age at entry increased, the speed of guardianship or custody increased, but this speed was quicker for those from agencies with smaller caseloads. Also, the interaction of child age at entry and agency use of non-family placements showed that for younger children, approximately age 8 and younger, the faster speed to guardianship or custody was for those from agencies with the highest use of non-family placement, yet for older children, approximately above the age of 8, those from agencies with lower use of non-family placements had faster speeds of guardianship or custody. This finding must be interpreted within a contextual understanding that fewer numbers of younger children are placed in non-family setting, such as group homes or institutions. Lastly, the interaction of child age at entry and agency engagement in alternative response was significantly related to speed of guardianship or custody. In general, the speed of guardianship or custody increased with age. The difference between children from agencies engaged in alternative response and those from agencies who were not engaged in alternative response was greatest at younger ages and gradually converged, with the faster times to guardianship or custody for those children from agencies not engaged in alternative response.

Comparing Naïve versus Corrective Cox Models

One of the more striking findings was found when comparing the results of the evaluation of child, agency, and county characteristics using corrective-Cox models, which accounted for autocorrelation of nested data, versus naïve Cox models, which did not account for the nested nature of children within county child welfare agencies. While a few of the findings were consistent across both types of analytical models, several different findings were obtained when using naïve Cox models. In particular, some significant findings were

found to have increased levels of significance with naïve models. Also, the naïve models failed to identify some covariates found to be significant with the corrective-Cox models. Moreover, the naïve model frequently identified several characteristics as significantly related to timely permanency outcomes that were not shown to be significant with the corrective-Cox models. These findings strongly support the need to ensure appropriate analytical models are applied when evaluating child welfare data that is multi-level in nature.

Chapter 5: Assessing Competing Risks of Time to Achieve Permanency by Age

Evaluating Presence of Competing Risks

The discussion in Chapter 3 about competing risks provided the preliminary evidence supporting the need to evaluate time to permanency based on a competing risks framework. Specifically, the significant ($p<.0001$) Kaplan-Meier estimates for the median length of time in foster care to achieve each type of permanency outcome indicated the need to compare and assess each type of foster care permanency exit individually. Furthermore, given that the results of the corrective Cox models, which showed that age at entry was highly significant ($p<.0001$) with time to adoption and time to reunification, combined with a knowledge of theoretical developmental differences across age groups, the evaluation of competing risks of types of permanency should be stratified by age. Specifically, this study categorized children's age at entry into three age groups – infants ages 0 to 1, children ages 2 to 12, and adolescents ages 13 and older. The first question to be evaluated was whether the type-specific survivor functions were different across ages and permanency types. Several analytical approaches were used to help provide supporting evidence to answer this question, including Kaplan-Meier estimates, graphs of survivor curves, and Pearson chi-square tests to test the null hypothesis of equal hazards.

Median Time to Each Type of Permanency

A total of 4869 infants (27.18%), 9015 children (50.32%) ages 2 to 12, and 4031 adolescents (22.50%) achieved a permanency outcome of reunification, adoption, guardianship or custody, or emancipation during the 3 year study window. Table II in the

Appendix depicts the Kaplan-Meier estimates for the median length of time to achieve each type of permanency exit according to the three age groups. Of the infants that exited foster care during the three year study timeframe, about a third, 1672 children (34.34%), exited to reunification, 1908 infants (39.19%) exited to adoption, and about a quarter, 1289 infants (26.47%), exited to guardianship or custody. Among the children ages 2 to 12 that exited foster care, slightly less than half, 4411 children (48.93%), exited to reunification, 1469 children (16.30%) exited to adoption, and about a third, 3135 children (34.78%), exited to guardianship or custody. Of the adolescents ages 13 and older who exited foster care, more than half, 2165 adolescents (53.71%), exited to reunification, only 117 adolescents (2.90%) exited to adoption, about a quarter, 1080 adolescents (26.79%), exited to guardianship or custody, and 669 adolescents (16.60%) exited to emancipation.

In regard to reunification, the shortest median time to exit was 221 days for adolescents, while infants had a median time to reunification of 293 days and children ages 2 to 12 had a slightly longer median time of 295 days ($p<.0001$). Among children leaving foster care for adoption, the shortest median length of stay was equal for both infants and adolescents at 652 days, while children ages 2 to 12 had a median time to adoption of 766 days ($p<.0001$). For children achieving guardianship or custody, the shortest median time to exit was 266 days for adolescents, while children ages 2 to 12 had a median time of 280 days and infants had the longest median time with 287 days ($p<.05$). Given that only adolescents were old enough to exit foster care due to emancipation when they aged out of the foster care system at age 18, the time to emancipation was only estimated for adolescents throughout this analysis. The median time to achieve emancipation was 605 days.

Survivor Curves

Additionally, Figures IX, X, and XI below graphically depict the survivor curves for each type of permanency exit for each of the three age groups – ages 0 to 1, ages 2 to 12, and ages 13 and older respectively. For all three age groups, both reunification and guardianship or custody had similar survivor curves. However, adoption and emancipation followed a distinct survivor curve where greater numbers of children appeared to remain in care longer than those leaving due to reunification or guardianship or custody.

Figure IX

Survivor curves for children ages 0-1 for each type of permanency

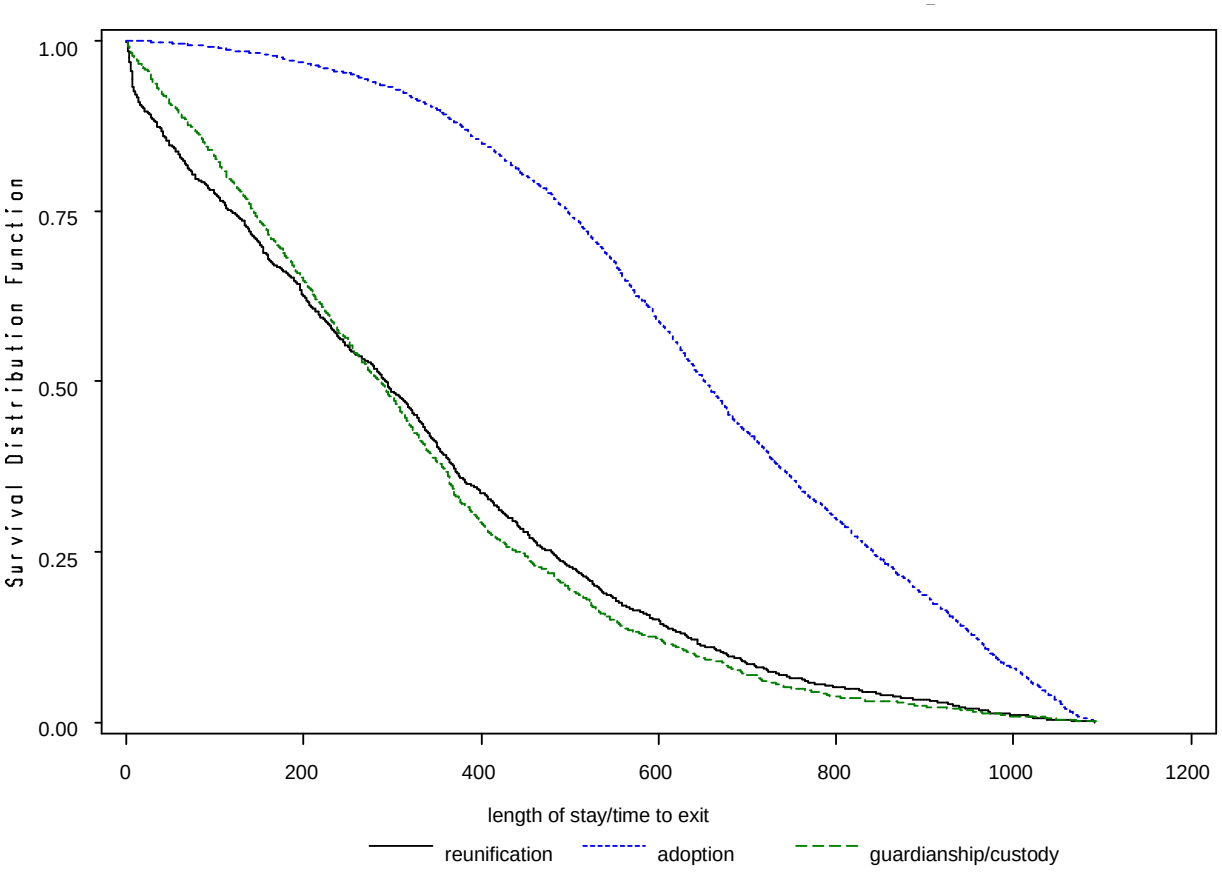


Figure X

Survivor curves for children ages 2-12 for each type of permanency

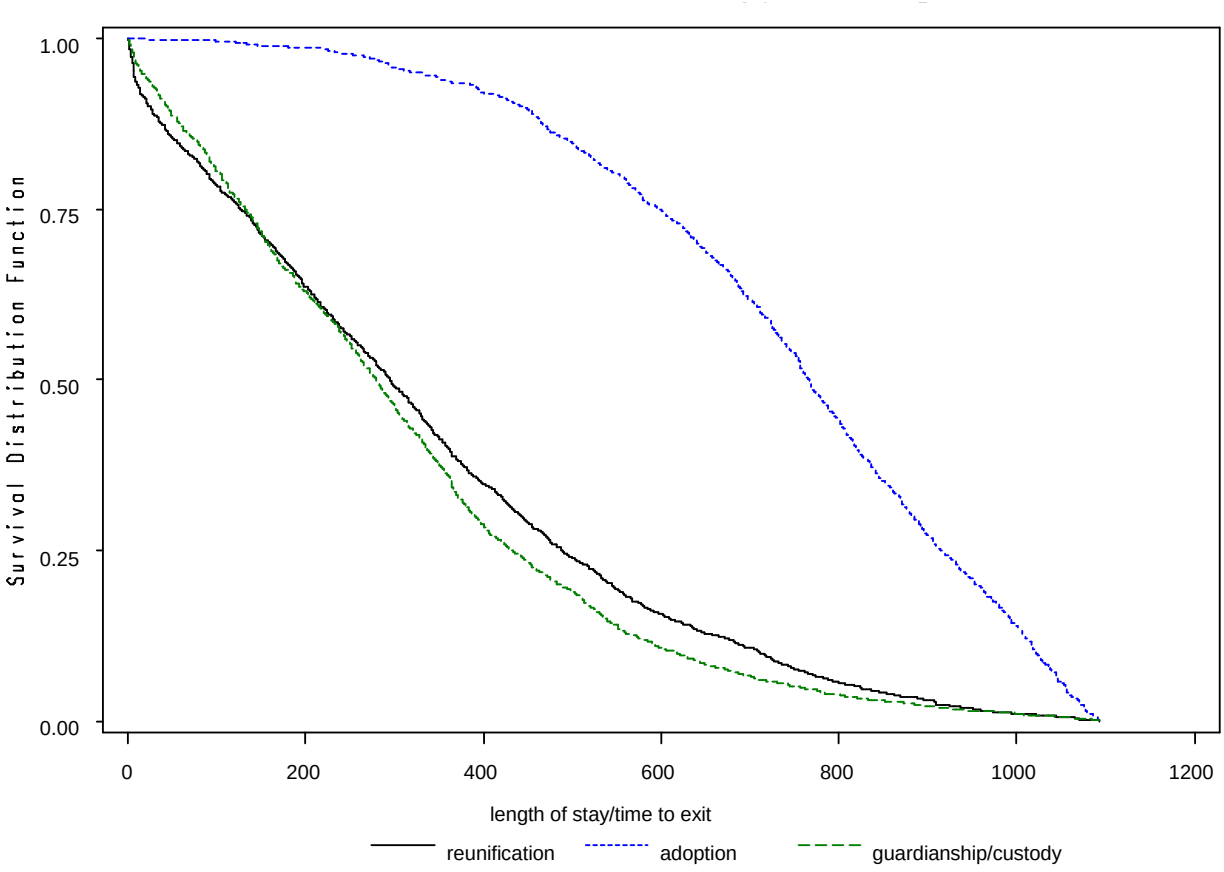
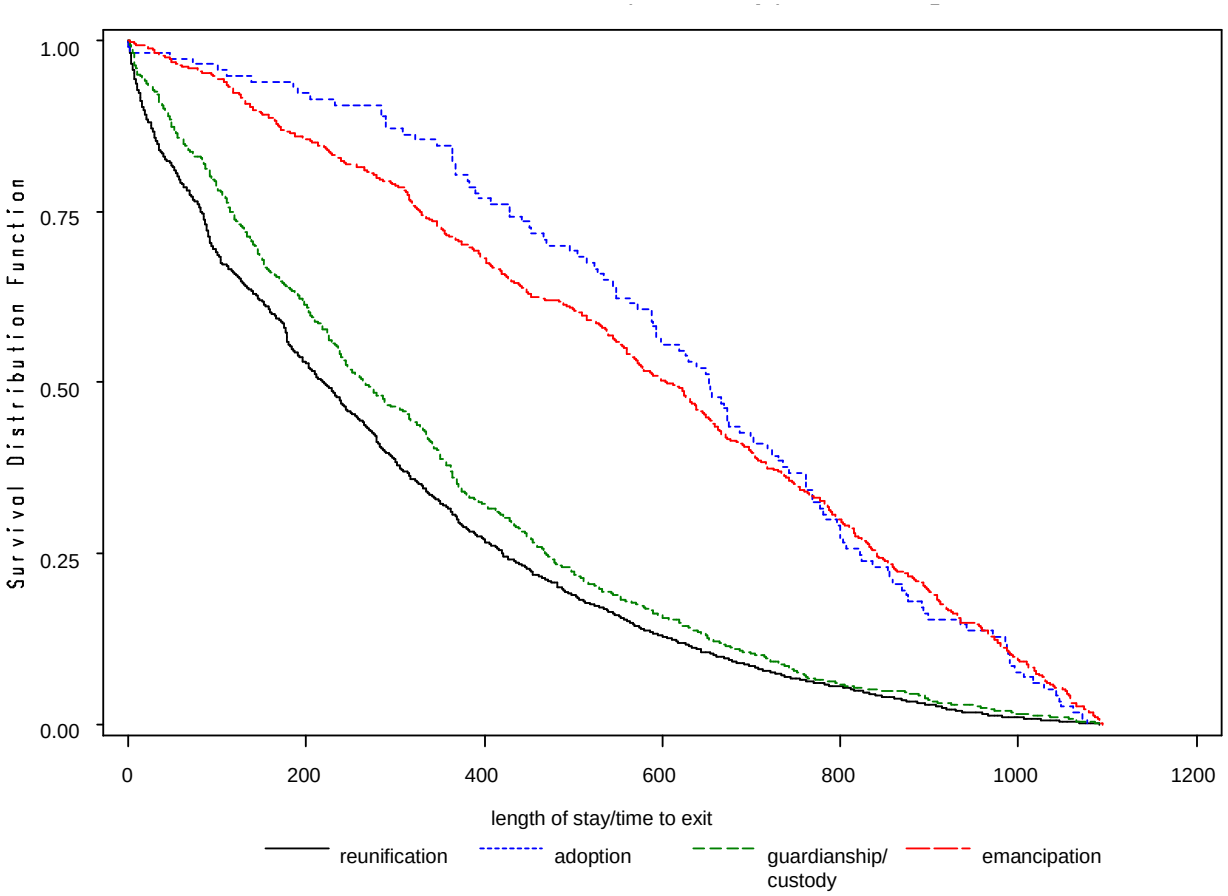


Figure XI

Survivor curves for children ages 13 and older for each type of permanency



Testing Null Hypothesis of Equal Hazards

Before deciding to conduct a competing risks analysis, the null hypothesis was tested to determine if the hazard functions were the same across all types of permanency outcomes. Testing the null hypothesis of equal hazards was conducted separately for each age group. In particular, the frequencies of children achieving each type of permanency outcome were used to estimate the overall expected frequency, which was used to calculate Pearson's chi-square by hand. The Pearson's chi-square for infants ages 0 through 1 was 94.009 (df = 2, $p<.001$), for children ages 2 through 12 was 1418.618 (df=2, $p<.0001$), and for adolescents ages 13

and older was 2167.79 (df=3, p<.0001). Since each of these results was highly significant, the null hypothesis of equal hazards across all types of permanency outcome was rejected, which further supported the need for a competing risks analysis.

Competing Risks: Ages 0 to 1

To assess competing risks, separate corrective-Cox models were estimated for each permanency type using the main effects evaluated in Chapter 4. Since all of the covariates in the corrective Cox model needed to be identical when testing each type of permanency type, only the main effect covariates were included. The cross-level interactions were excluded from this analysis, since results from Chapter 4 show that each type of permanency exit had different significant cross-level interactions. For assessing competing risks for infants, the age variable was estimated in months as opposed to years, to capture more of a variance among ages of children in the infant sample.

The null hypothesis, that all coefficients were equal across permanency exit types, was evaluated by testing the significance of the difference between the likelihood-ratio chi-square for the null model, where all types of exits are treated equal, and the sum of the -2 log-likelihood statistics from all the type-specific models. The resulting difference was the likelihood-ratio chi-square for the null hypothesis, which was 4217.406 (df = 32) and was statistically significant (p<.0001), which supported the rejection of the null hypothesis that the coefficients were equal across all types of permanency exits.

Table VII in the Appendix depicts the results from the competing risks LWA main effects models for each type of foster care exit for infants ages 0 to 1. The number of children included in each LWA model that achieved each type of permanency exit was reported, along with the number of cases that were censored. Information from a total of 5,648 infants

were included in the analysis for each model, where 1642 infants (29.07%) achieved reunification, 1790 infants (31.69%) achieved adoption, and 1264 infants (22.38%) achieved guardianship or custody.

Reunification

For time to reunification for infants, age at entry, as measured in months, was significant ($p<.0001$) with a hazard ratio of 1.029, meaning that with each one-month increase in age at entry, the speed of reunification became faster by 2.9%. In addition, Hispanic ethnicity was significant ($p<.001$) for infants in regard to reunification, where the hazard ratio was 1.455, meaning Hispanic infants had a 45.5% faster speed of reunification that non-Hispanic infants. Also, abuse as a reason for placement was significant ($p<.0001$) for infants with a hazard ratio of 1.367, meaning that the likelihood of reunification was 36.7% quicker for those with abuse as a reason for placement than those without abuse as a reason for placement. Only one covariate was significant among all agency and county characteristics evaluated. The number of children in the agency's foster care caseload, as measured in units of 100, was significant ($p<.01$) with a hazard ratio of 0.948, meaning that for every additional 100 children in the size of the foster care caseload, the speed of reunification for infants slowed by 5.2%. To interpret this measure another way, this hazard ratio also means that for every additional child in the foster care caseload, the speed for reunification slowed by 0.052%. In addition, the likelihood ratio model chi-square was 214.42 ($df = 16$, $p<.0001$) indicating good overall model fit.

Adoption

For time to adoption for infants, the hazard ratio for age at entry was 0.962 ($p<.0001$), indicating that the speed of adoption decreased 3.8% with each one-month increase in age at

entry. Race was also significant ($p<.0001$) for infants in regard to adoption, where they had a hazard ratio of 0.633, meaning that infants who were children of color had a 36.7% slower rate of achieving of adoption compared to infants who were white. Both abuse and neglect as reasons for placement had very similar hazard ratios for adoption for infants. Specifically, abuse as a reason for placement had a hazard ratio of 0.684 ($p<.01$) and neglect as a reason for placement was 0.685 ($p<.001$). These can be interpreted as those children that had abuse or neglect as reasons for placement had a speed of adoption that was slower by 31.6% or 31.5%, respectively, than that for infants without each type of maltreatment as a reason for placement. In addition, two child welfare agency characteristics were statistically significant ($p<.05$) for time to adoption for infants. In particular, use of relative placements had a hazard ratio of 0.986, meaning that for each one-percent increase in use of relative placement, the speed of adoption for infants slowed by 1.4%. Also, for agencies with a history of reform, the hazard ratio was 1.316, meaning that infants from agencies that were engaged in reform efforts had a speed of achieving adoption that was 31.6% quicker than that for infants who were not from agencies that had a history of reform. Also, the model for adoption demonstrated good overall model fit since the chi-square was 237.03 ($df = 16$, $p<.0001$).

Guardianship or Custody

For time to guardianship or custody for infants, age in months was the only significant child characteristics. Specifically, age at entry had a hazard ratio of 1.017 ($p<.0001$), meaning the speed of guardianship or custody was 1.7% faster with every one-month increase in age at time of entry. Only one child welfare agency covariate was also significant, namely the size of the agency's caseload. Caseload size had a hazard ratio of 0.951 ($p<.05$), meaning that for every 100 additional children in agency caseload, the speed

of guardianship or custody slowed by 4.9%, which, in other words, means for that each one additional child to a caseload, the speed of adoption for infants decreased by 0.049%. Also, the county characteristics of percent of individuals living in poverty was significant ($p<.001$) with a hazard ratio of 1.037, so that with every one percent increase in individuals living in poverty, the speed of infants achieving guardianship or custody was 3.7% faster. In addition, the model chi-square was 108.18 ($df = 16$, $p<.0001$) indicating good model fit.

Competing Risks: Ages 2-12

As with assessing competing risks of different types of permanency exits for infants, separate corrective-Cox models were also estimated for each type of foster care exit for children ages 2 through 12. To test the null hypothesis, that all coefficients were equal across permanency exit types, the likelihood-ratio chi-square was estimated to be 8891.752 ($df = 32$), which was statistically significant ($p<.0001$). These results allowed for the rejection of the null hypothesis that the coefficients were equal across all types of permanency exits for children ages 2 through 12.

Table VIII in the Appendix depicts the results from the competing risks LWA main effects models for each type of foster care exits for children ages 2 through 12. Information from a total of 11,211 children ages 2 through 12 were included in the analysis for each model, where 4332 children (38.64%) achieved reunification, 1445 children (12.89%) achieved adoption, and 3083 children (27.50%) achieved guardianship or custody.

Reunification

Several child characteristics were significant for time to reunification for children ages 2 through 12. Specifically, Hispanic ethnicity had a hazard ratio of 1.595 ($p<.0001$), indicating that Hispanic children achieved reunification 59.5% faster compared to children

who were not Hispanic. Also, both abuse and neglect as reasons for placement were significant ($p<.05$) with hazard ratios of 1.16 and 0.836 respectively. These results show that children ages 2 to 12 who had abuse as a reason for placement were 16% quicker to achieve reunification than those children who did not have abuse as a reason for placement. However, children with neglect as a reason for placement were 16.4% slower to achieve reunification than children who did not have neglect as a reason for placement. Also, the number of children in the foster care caseload was significant ($p<.01$) with a hazard ratio of 0.948, meaning that for every increase in 100 children in an agency's caseload size, the speed of reunification was 5.2% slower. In other words, for every additional child in the foster care caseload, the speed to reunification decreased by 0.052%. Additionally, the county characteristics of unemployment was also significant ($p<.05$) with a hazard of 1.047, indicating that for every one-percent increase in unemployment in a county the speed of reunification was 4.7% quicker. Also, the model chi-square statistic of 277.39 ($df = 16$, $p<.0001$) indicated good model fit.

Adoption

For time to adoption for children ages 2 through 12, almost all of the child characteristics were significant. Specifically, age at entry had a hazard of 0.868 ($p<.0001$), meaning that with every one-year increase in child's age at time of entry, their speed to achieve adoption decreased by 13.2%. Also, gender was significant ($p<.01$) with a hazard ratio of 1.139, indicating that females achieved adoption 13.9% quicker than males. Race was highly significant ($p<.0001$) with a hazard of 0.622, meaning that children of color between the ages of 2 and 12 achieved adoption 37.8% slower than white children. Hispanic ethnicity was also significant ($p<.05$) with a hazard ratio of 1.359, indicating that Hispanic

children achieved adoption 35.9% quicker than non-Hispanic children. Another child characteristic that was significant ($p<.01$) was abuse as a reason for placement with a hazard ratio of 0.73, meaning that children with abuse as a reason for placement achieved adoption at a rate that is 27% slower than that of children without abuse as a reason for placement. Although there were numerous child characteristics related to timely adoption, only one agency characteristics was significant. Specifically, whether the agency engaged in reform efforts was significant ($p<.01$) with a hazard ratio of 1.559, indicating that children ages 2 through 12 from agencies that had a history of reform efforts had a speed of adoption that was 55.9% greater than that for children from child welfare agencies that were not engaged in reform. The overall model fit for adoption was good with a chi-square of 505.44 ($df = 16$, $p<.0001$).

Guardianship or Custody

For time to guardianship or custody for children ages 2 through 12, only one child characteristic was significant. Specifically abuse as a reason for placement was significant ($p<.05$) with a hazard ratio of 0.85, indicating that children with abuse as a reason for placement had a speed of guardianship or reunification that was 15% slower than that for children who did not have abuse as reason for placement. Two child welfare agency characteristics were significant, namely use of relative placement and engagement in alternative response. The hazard ratio for agency use of relative placement was 1.015 ($p<.05$), meaning that with each one-percent increase in the use of relative placements, the speed of guardianship or custody increased by 1.5%. The hazard ratio for agency engagement in alternative response was 0.812 ($p<.05$), indicating that children from agencies that were implementing alternative response achieved guardianship or custody at a rate that was 18.8%

slower than that for children from agencies not engaged in alternative response. Also, one county characteristic was significant for timely guardianship or custody. Specifically, the percent of individuals in a county living in poverty was significant ($p<.01$) with a hazard ratio of 1.032, indicating that with each one-percent increase in poverty, the speed of achieving guardianship or custody increased by 3.2%. In addition, the model chi-square of 238.51 ($df = 16$, $p<.0001$) indicated good model fit.

Competing Risks: Ages 13 and Older

To evaluate whether all coefficients were equal across all permanency exit types, the likelihood-ratio chi-square for the null hypothesis was found to be 7032.698 ($df = 48$, $p<.0001$). These results of the likelihood-ratio chi-square test supported the rejection of the null hypothesis that the coefficients were equal across all types of permanency exits for children ages 13 and over. Information from a total of 5054 adolescents ages 13 and older were included in the analysis for each model, where 2112 adolescents (41.79%) achieved reunification, 115 adolescents (2.28%) achieved adoption, 1061 adolescents (20.99%) achieved guardianship or custody, and 659 adolescents (13.04%) emancipated from foster care.

Reunification

The results of the LWA models for the competing risks analysis for youth ages 13 and older are depicted in Table IX in the Appendix. For reunification, almost all of the child characteristics were significant. In particular, child age at entry had a hazard ratio of 1.07 ($p<.01$), meaning that for every one-year increase in the youth's age at time of entry, the speed of reunification increased by 7%. Also, race was significant ($p<.05$) with a hazard ratio of 0.869, indicating that adolescents of color achieved reunification 13.1% slower than that

of white adolescents. Hispanic ethnicity was also significant ($p<.05$) with a hazard ratio of 1.307, meaning that Hispanic adolescents reunify 30.7% faster than non-Hispanic children. In addition, both abuse ($p<.01$) and neglect ($p<.0001$) as reasons for placement were significantly related to timely reunification of adolescents. Specifically, abuse as a reason for placement had a hazard ratio of 0.824, indicating that adolescents with abuse as a reason for placement reunified 17.6% slower than that of adolescents without abuse as a reason for placement. Neglect as a reason for placement had a hazard of 0.718, indicating that adolescents with neglect as a reason for placement had a speed of reunification that was 28.2% slower that that for children without neglect as a reason for placement. Furthermore, the agency characteristics of use of relative placements was significant ($p<.05$) with a hazard ratio of 1.01, indicating that with every one-percent increase in an agency's use of relative placement, the speed of reunification was 1% faster. Also, county unemployment with a hazard ratio of 1.093 was also significant ($p<.01$), meaning that with every one-percent increase in unemployment, the speed of reunification became 9.3% quicker. Lastly, good model fit for reunification was demonstrated with a chi-square of 165.72 ($df = 16$, $p<.0001$).

Adoption

Only one characteristic was significantly related to timely adoption for adolescents. Specifically, age at time of entry was significant ($p<.01$) with a hazard ratio of 0.803. This finding means that with every one year increase in age of adolescents at entry, their speed of achieving adoption was 19.7% slower. The model chi-square for adoption was 46.71 ($df = 16$, $p<.0001$).

Guardianship or Custody

A few characteristics were found to be significantly related to time to achieve guardianship or custody for adolescents. In particular, neglect as a reason for placement was significant ($p<.01$) with a hazard ratio of 1.26, meaning that adolescents with neglect as a reason for placement were 26% quicker to achieve guardianship or custody compared to those adolescents that did not have neglect as a reason for placement. Also, two county characteristics were significantly related to timely guardianship or custody. County poverty had a hazard ratio of 1.021 ($p<.05$), indicating that with every one-percent increase in poverty in a county, the speed of achieving guardianship or custody became 2.1% quicker. In addition, county unemployment had a hazard of 1.079 ($p<.05$), meaning that with every one-percent increase in unemployment in a county, the speed of achieving guardianship or custody was 7.9% faster. The model fit results showed a chi-square of 49.12 ($df = 16$, $p<.0001$).

Emancipation

Emancipation was the last type of permanency exit which was only assessed for adolescents. Several child characteristics were related to achieving emancipation. Specifically, as expected, age at entry was highly significant ($p<.0001$) with a hazard ratio of 4.541, meaning that with every additional year in age at entry, the speed of emancipation was over four times faster. This result was expected given that the outcome of emancipation is based on foster youth reaching the age of 18, at which point their placement in foster care is allowed to terminate. In addition, both race and ethnicity were also significantly related to emancipation. Adolescents of color had a hazard of 0.766 ($p<.01$), meaning that their speed to achieve emancipation was 23.4% slower than that of white adolescents in foster care. Also,

Hispanic adolescents had a hazard ratio of 0.572 ($p<.05$), indicating that they achieved emancipation 42.8% slower than that of non-Hispanic adolescents. The model chi-square of 1695.56 ($df = 16$, $p<.0001$) indicated good model fit.

Overview of Findings

Evaluation of Competing Risks

Assessing whether time to achieve different permanency outcomes was best assessed with a competing risks analytical framework. Comparisons could be made across different permanency types as well as across each age group. Differences were identified among children's age groups in regard to median times to achieve each type of permanency outcome. Specifically, adolescents had the shortest median time to reunification and guardianship or custody, yet surprisingly both adolescents and infants both had the same median time to adoption. Survivor curves were also obtained to plot the survival distributions for each type of permanency exit by age group. Although the survivor curves for reunification and guardianship or custody followed a similar pattern, adoption and emancipation followed a very different trajectory. In addition, for each age group, analysis of Person's chi-square statistics allowed for the rejection of the null hypothesis, that hazard rates were equal across all permanency types. Given the evidence supporting that different age groups had different times to achieve each type of permanency outcome, a competing risks framework stratified by age groups was applied to further assess how child, agency, and county characteristics related to achievement of timely permanency outcomes.

Timely Permanency for Infants

Competing risks analysis allowed for identifying commonalities and differences in how covariates related to each type of permanency exit. For infants, age as measured in

months, was significant across each type of exit from foster care. The hazard ratios for age showed an increase in the speed of reunification or guardianship and custody with every one-month increase in age at entry for infants. However, the hazard ratio for age showed a decrease in speed to adoption for infants with every one month increase in age at entry. Race was only significant for adoption, where infants of color had a decreased speed of adoption compared to white infants. Hispanic ethnicity was only significant for reunification, where Hispanic infants had an increased speed of reunification compared to non-Hispanic infants. Also, abuse as a reason for placement had a positive hazard ratio for reunification yet negative hazard ratio for adoption, indicating that having abuse as a reason for placement increased speed of reunification but decreased speed of adoption. Neglect as a reason for placement was only significant for adoption, where infants with neglect as a reason for placement had decreased speed of achieving adoption. In terms of child welfare agency characteristics, caseload size was significant for reunification and guardianship or custody, where in each case as the size of the caseload increased, the speed for exiting foster care decreased. Use of relative placement was significant only for adoption, where the increased use of relative placements had a decreased speed of adoption. Also, agency involvement in reform efforts was significant only for adoption, where engagement in reform had an increased speed of adoption. The only significant county characteristic for infants was poverty, which was related to an increased speed of achieving guardianship or custody.

Timely Permanency for Children Ages 2 through 12

For children ages 2 through 12, some of the covariates had similar relationships as were identified with the analysis of infants, however several differences were also identified. Specifically, age was only significant for timely adoptions, where the speed of adoptions

decreased as children's age at entry increased, which was consistent with the finding for adoption of infants. Although gender was not significant for infants, gender was significant for timely adoptions for children ages 2 through 12, where females had faster speeds of adoption than males. As was the case with infants, race was only significant for adoptions, with children of color having slower speeds to achieve adoptions than white children. Hispanic ethnicity, however, was significant for both reunification and adoption for children ages 2 through 12, where Hispanic children had faster achievement of reunification and faster achievement of adoptions compared to that of non-Hispanic children. Having abuse as a reason for placement was significant for all types of permanency exits, yet impacted each outcome differently. Children with abuse as a reason for placement had a faster speed of achieving reunification, but slower speeds of achieving adoption and guardianship or custody, compared to those that did not have abuse as a reason for placement. As was the finding with infants, neglect as a reason for placement was only significant for children ages 2 through 12 achieving adoption, where children with neglect as a reason for placement had slower speeds of adoption, compared to those children that did not have neglect as a reason for placement. The child welfare agency characteristic of caseload size was only significant for timely reunifications, which demonstrated slower speeds to reunification as the size of the caseload increased. Use of relative placement was significantly related to timely achievement of guardianship or custody, where increased use of relative placement increased the speed of guardianship or custody for children ages 2 through 12. Also, agency engagement in alternative response was only significantly related to guardianship or custody, where children from agencies implementing alternative response had slower speeds to achieving guardianship or custody. As was the case with infants, agency history of child welfare reform

was only significantly related to timely achievement of adoptions for children ages 2 through 12, where children from agencies with a history of reform had faster speeds of achieving adoption than children from agencies that had not engaged in reforms. In addition, as was the finding from evaluating infants, the county poverty rate was related to achievement of guardianship or custody for 2 through 12 year olds, where increased poverty was associated with a faster speed of guardianship or custody. County unemployment rate was only related to achievement of reunification, where increases in unemployment were related to faster achievement of reunification.

Timely Permanency for Adolescents

Assessing competing risks for adolescents not only evaluated timely reunification, adoption, guardianship or custody, but also assessed achievement of emancipation from foster care. While a few of the covariates found to be significantly related to permanency outcomes for infants and children ages 2 through 12 were also significant for adolescents, many covariates had different relationships for adolescents. As was the case with both infants and children ages 2 through 12, age was found to be significantly related to adoption, where increased age at entry had decreased speeds of achieving adoption. Age was also significant for reunification and emancipation, where an increase in age at entry was associated with an increased speed for achievement of reunification and emancipation. Also, race was related to both reunification and emancipation, where adolescents of color had slower speeds to achieve these exits from foster care. Hispanic ethnicity was related to reunification, where Hispanic adolescents had faster speeds of reunification. In addition, Hispanic ethnicity was also significantly related to emancipation, where Hispanic adolescents had a decreased speed to emancipation. Abuse as a reason for placement was only significant for reunification,

however this differed from the findings of infants and children ages 2 through 12 in that adolescents with abuse as a reason for placement had a decreased speed of reunification. Neglect as a reason for placement was significantly related to both reunification and guardianship or custody. Adolescents with neglect as a reason for placement had decreased speeds to achieve reunification, but adolescents with neglect as a reason for placement had increased speeds to guardianship or custody. Use of relative placement was the only child welfare agency characteristic related to any permanency outcome for adolescents. Specifically, use of relative placement was related to reunification, where the increased agency use of relative placement was related to an increased speed of achieving reunification. Consistent with the finding from both infants and children ages 2 through 12, the county poverty rate was related to guardianship or custody, where an increase in poverty was related to an increase in speed of achieving guardianship or custody. County unemployment was also related to both reunification and guardianship or custody, where adolescents had faster speeds of achieving each of these types of exits from foster are as the county unemployment rates increased. As shown with these results, the use of a competing risks framework, especially when stratified by age, clearly depicted the differences in relationships among a variety of child, agency, and county characteristics in regard to achieving different types of permanency outcomes.

Chapter 6: Conclusion and Implications

Conclusion

This study used an innovative analytical approach to evaluate the relationship of how child, agency, and county characteristics are related to achieving timely permanency outcomes for children in foster care. Given the autocorrelated nature of child welfare data, where children are nested within local county child welfare agencies, corrective-Cox proportional hazard models were used to estimate timely achievement of reunification, adoption, guardianship and custody, as well as emancipation. Furthermore, because achievement of permanency outcomes was mutually exclusive and there were significant differences among times to achieve each type of permanency outcome, a competing risks analytical framework with age stratification was applied to further examine the relationship of child, agency, and county characteristics. These numerous findings provide a valuable contribution to the literature, which attempts to better understand factors are related to timely achievement of permanency outcomes for children in foster care. The results of this study, along with the successful application of this methodological approach, provide many potential implications for the field of child welfare.

Review of Findings

This study sought to examine the research question, “how are child, agency, and county contextual factors related to achieving timely permanency outcomes for children in foster care?” With results obtained from numerous analyses throughout this study, a comprehensive table of hazard ratios and significance levels of all child, agency, and county

characteristics for each type of permanency outcome are depicted in Table X in the Appendix. Also, an additional summary table is provided in the Appendix, titled Table XI, which depicts the direction of the relationship and level of significance for only those factors that were identified as significant in any of the analyses.

Child characteristics.

Results from the study consistently supported the first hypothesis that child characteristics are related to achieving timely permanency outcomes. Specifically, child age at entry, gender, race, Hispanic ethnicity, and abuse and neglect as reasons for placement were all found to be significantly related to one or more permanency outcomes.

Child age at entry was found to be significantly related to achieving reunification with all models tested, except for the model evaluating children ages 2 through 12. As child age at entry increased the speed to reunification also increased. Child age at entry was also consistently found across all models to be significantly related to timely adoptions, however as age at entry increased, the speed of adoptions decreased. When evaluating timely guardianship or custody, age at entry was only significant for infants ages 0 to 1, where with every increase in age in months at time of entry, the speed of guardianship or custody increased. As expected, age was also highly significant for emancipation, where with every additional year in age at entry, the speed of emancipation increased four-fold. Although age at entry was, to some extent, related to each type of permanency outcome, these findings demonstrated a clear relationship between age at entry and reunification, adoption, and emancipation. In particular, the role of age cannot be ignored in assessing timely achievement of reunification and adoption, since increases in age at entry is associated with faster achievement of reunifications yet slower achievement of adoptions.

Although not as consistent as the finding for age, several models, identified child gender as significantly related to reunification and adoption. Specifically, the models testing including children from all ages that tests main effects and main effects with cross-level interaction models for reunification demonstrated significant relationships with gender, where females had slower speeds of reunification compared to males. The opposite finding was identified for adoption, however, where females had faster times to achieve adoption compared to males, which was found with three of the adoption models, including the model for all ages that tested main effects and main effects with cross-level interaction models, as well as the model for children ages 2 through 12. These results showed important gender differences in regard to achieving timely reunifications and adoptions.

Child race was also found to be significant with several types of permanency exits. Only one model for reunification, where the main effects were evaluated for adolescents ages 13 and older, demonstrated a significant relationship with race, where adolescents of color had slower achievement of reunification compared to their white counterparts. In addition, child race was found to have a more consistent and highly significant relationship with adoption. All models evaluating adoption, except the model for adolescents age 13 and above, had highly significant findings that children of color had much slower rates of achieving adoption than white children. Race was also found to be significantly related to emancipation, where adolescents of color achieved emancipation at a slower rate than white adolescents. These findings demonstrate that children of color consistently had slower rates of achieving permanency outcomes, which is especially present for those striving to achieve adoption. One possibility that needs further exploration is that this finding for adoption may be related to the availability of families of color who serve as adoptive families, which may be limited

in some local areas, contributing to children of color remaining in care for longer period of time.

Although child Hispanic ethnicity was found to be significantly related to some of the models for timely adoption and emancipation, Hispanic ethnicity was most strongly related to reunification. All models evaluated for reunification demonstrated significant relationships with Hispanic ethnicity, showing that Hispanic children had much faster achievement of reunification compared to non-Hispanic children. Also, Hispanic children were found to be related to adoption for children ages 2 through 12, where Hispanic children in this age group achieved adoption more quickly than those children who were not Hispanic. Alternatively, however, Hispanic ethnicity was found to be significantly related to emancipation, where Hispanic children achieved emancipation more slowly than non-Hispanic children. The dominant finding that Hispanic children are much quicker to achieve reunification across all age groups suggests that Hispanic families may embody cultural qualities or values that allow for faster reunification once children are removed from the home. Also, the differences in findings from evaluating both child race and ethnicity provide additional evidence for the need to segregate analysis of child race and Hispanic ethnicity when assessing achievement of child welfare outcomes of minority children, since each have different relationships with timely achievement of permanency outcomes.

Children having abuse as a reason for placement was found to be significantly related to achievement of reunification, adoption, and guardianship or custody. Although each of the age stratified models identified abuse as a reason for placement as significant, children with abuse as a reason for placement who were infants ages 0 to 1 as well as children ages 2 through 12 were shown to have increased speeds of reunification, while adolescents with

abuse as a reason for placement showed a slower speed of reunification. The finding for abuse as a reason for placement in regard to adoption was the opposite, however, where all models evaluating adoption, except for that of adolescents ages 13 and older, found that children with abuse as a reason for placement had much slower rates of achieving adoption. Abuse as a reason for placement was only significant for one model evaluating guardianship and custody, where children ages 2 through 12 with abuse as a reason for placement had a slower rate of achieving guardianship or custody. This mix of findings indicated that younger children, less than the age of 13, with abuse as a reason for placement had a faster rate of achieving reunification yet slower rate of achieving adoption, while adolescent with abuse as a reason for placement had a slower rate of achieving reunification but faster rate of achieving adoption. These results could in part be related to the severity of abuse or the perpetrator of the abuse, however these factors were beyond the scope of covariates evaluated with this study and future research could help better understand these relationships.

Children with neglect as a reason for placement was also found to be significantly related to achievement of reunification, adoption, and guardianship or custody. All models evaluating reunification, except for the age stratified model for infants ages 0 to 1, showed a significant relationship with neglect as a reason for placement. The results consistent demonstrated that children with neglect as a reason for placement had slower speeds of reunification. In addition, three of the adoption models, including both models using all ages of children as well as the model for infants, showed a significant relationship with neglect as a reason for placement, where children with neglect as a reason for placement had slower speeds of achieving adoption. Also, neglect as a reason for placement was only significant for adolescents ages 13 and older for achieving guardianship or custody, where those with

neglect as a reason for placement had faster speeds of exiting foster care to guardianship or custody. These results showed that in general children in foster care due to neglect, which was 80% of the study sample, had slower times to achieve reunification and adoption. It is important to further investigate the relationship between neglect and achievement of permanency since the majority of children entering foster care come into the system because of neglect.

Agency characteristics.

A few of the child welfare agency characteristics tested were also found to be significantly related to timely achievement of permanency outcomes, thereby supporting the second hypothesis that child welfare characteristics are related to achieving timely permanency outcomes. In particular, four of the agency characteristics were identified as significantly related to at least one permanency outcome, namely size of the agency's foster care caseload, agency use of relative placements, agency engagement in alternative response, and agency history of engaging in child welfare reform efforts.

The size of an agency's foster care caseload was found to be significant for almost all models tested for timey reunification, with the exception of the model for adolescents ages 13 and older. This relationship between caseload size and reunification demonstrated that as caseload size increase, the speed of reunification became slower. In addition, two of the models evaluating guardianship or custody identified caseload size as significant, specifically the models testing all ages of children for main effects with cross-level interactions model and the stratified main effects model for infants. Both of these results also showed that as the caseload size increased, the speed of achieving guardianship or custody decreased. A possible explanation of these findings may be related to the workforce burden on county

agencies that have high numbers of children in their foster care caseload, which may not allow child welfare workers to invest sufficient time to achieve timely reunification or find alternative permanent placements, such as guardianship or custody.

Local child welfare agency use of relative placements was found to be significantly related to achievement of reunification, adoption, and guardianship or custody. Both models evaluating all ages of children along with the stratified model for adolescents showed that with increased use of relative placements, children were able to achieve reunification at a faster rate. The opposite was found true for adoption, however, where the model testing main effects with cross-level interactions for all ages as well as the stratified model for infants demonstrated that as agency use of relative placements increased, the speed to achieve adoption decreased. Child welfare agency use of relative placements was only found to be significant for one of the models that tested guardianship or custody. The stratified model for children ages 2 through 12 showed that children ages 2 through 12 from agencies with increased use of relative placements tended to have faster achievement of guardianship or custody. These mixed results may be difficult to interpret since increased use of relative placements to some extent seemed to quicken the speed of achieving reunification and guardianship or custody, while it seemed to slow down the speed of achieving adoption. One possible explanation may be that higher usage of relative placements allows relatives to be engaged and supportive of the family, which may expedite the path to reunification and open up opportunities for relatives to gain custody or become legal guardians. The finding that increased use of relative placements slows achievement of adoption may be due to relatives' resistance to engage in legally terminating parental rights, however this notion is only speculative at this point.

Agency engagement in alternative response was found to be significant for two of the models evaluating timely achievement of guardianship or custody, specifically the model testing main effects with cross-level interactions for all ages and the main effect model for children ages 2 through 12. Both of these results demonstrated that children from agencies that were implementing alternative response had a slower speed of achieving guardianship or custody. A possible rationale for why agency engagement in alternative response would be significantly related to only this permanency outcome is puzzling. Alternative response systems have an assessment track to engage families with less severe maltreatment and a forensic track that accepts the more severe maltreatment cases, potentially leading to the possibility for the children to enter into foster care. Given the nature of alternative response to divert less severe cases from entering into foster care, it is uncertain as to why this would only impact achievement of guardianship or custody and not the other types of permanency outcomes.

Child welfare agency history of engaging in child welfare reform efforts was found to be significantly related to adoption in all but one model, which was the model evaluating adolescents ages 13 and older. The majority of models evaluating adoption found that children from agencies that had a history of engagement in some type of child welfare reform had a much faster achievement of adoption. This result may be directly related to the types of reform initiatives that were implemented by these agencies, which may have involved targeted efforts to improve timely adoptions for children.

County characteristics.

Several significant findings among county characteristics and permanency outcomes support the hypothesis that county demographics are related to achieving timely permanency

outcomes. Two of the three county characteristics, specifically county poverty and county unemployment, were found to be significantly related to achievement of permanency outcomes.

County poverty was found to be significantly related to achievement of adoption as well as achievement of guardianship or custody. In regard to adoption, poverty was identified as significant in the two models testing all ages of children, which showed that with increasing level of poverty in a county was associated with slower speeds of achieving adoption. Conversely, for achieving guardianship or custody, all of the models testing guardianship or custody demonstrated significant results for county poverty, where increasing poverty in a county was associated with faster achievement of guardianship or custody. One possible reason for the decline in speed to achieve adoption in counties with high poverty rates may be the lack of post-adoption financial subsidies for adoptive families. However, a plausible reason for why there is a faster speed of guardianship and custody in counties with higher poverty is unclear.

County unemployment was significantly related to achieving reunification as well as guardianship or custody. For reunification, county unemployment was found to be significant in all models except the model for infants. All of the other models for reunification demonstrated that as unemployment in counties increased, the speed to reunification increased. Also, county unemployment was only found to be significant with the main effects model testing adolescents ages 13 and older, which demonstrated that as unemployment increased, the rate of achieving guardianship and custody for adolescents became faster. The finding for expedited reunification in counties with high unemployment may be due in part to

greater number of unemployed parents having more time to devote to meeting requirements for reunification, such as participating in services and attending meetings and court dates.

Cross-level interactions.

This research had two hypotheses regarding the relationship of cross-level interactions and their relationship with permanency outcomes. The first hypothesis, that cross-level interactions between child characteristics and child welfare agency characteristics are related to achieving timely permanency outcomes, was found to have supporting evidence from the research findings. However, the research findings did not support the second hypothesis, that cross-level interactions between child characteristics and county demographics are related to achieving timely permanency outcomes. The study results showed that only cross-level interactions between child characteristics and agency characteristics were significantly related to timely permanency, while there were no significant cross-level interactions between child characteristics and county demographics. All but one of the significant cross-level interactions involved the child characteristic of age at time of entry into foster care. These findings provided strong support for the importance of child age and the need to assess competing risks models that were stratified by age group.

In regard to timely reunification, the interaction between child age at entry and the agency's access to a family court was significant, showing that although the speed of reunification generally increased as age at entry increased, the availability of a family court was related to a slower rate of increase in reunification speed compared to those from agencies without family courts. Although this finding may appear to demonstrate that family courts may delay the achievement of reunification, this relationship needs further examination to better understand the impact of family courts, particularly in regard to

whether family courts help facilitate more cases to pursue reunification or whether family courts help to improve post-reunification outcomes, such reducing subsequent maltreatment.

Two cross-level interactions were significant for adoption, specifically child age at entry and agency use of relative placement as well as the interaction of child race and agency access to a family court. For the interaction of age and agency use of relative placement, the speed of adoption gradually declined with age at entry, but the influence of agency use of relative placement was different for younger children than it was for older children. For younger children, the speed to adoption was slight faster for those from agencies with lower use of relative placement, but for older children, the speed to adoption was slightly quicker for those from agencies with higher use of relative placement. A possible explanation for this relationship is unknown. More information would help to better understand this relationship, such as knowing whether the adoptions are being pursued by relatives or non-family members. The second significant interaction for timely adoptions was the interaction of child race and agency access to family court. This interaction showed that children of color had similar speeds of achieving adoption regardless of access to family courts, but white children from agencies with access to family courts had faster speeds of adoption than those from agencies without access to family courts. This relationship is intriguing and requires further research to assess whether there are racial differences in regard to children's experiences and outcomes with their involvement in family courts.

Three cross-level interactions were significant for achieving guardianship or custody, where child age at entry was identified as the child characteristics for all three interactions. Specifically, the interaction of child age at entry and agency caseload size was significant, demonstrating that as child age increased, the speed of guardianship or custody increased, but

this speed was quicker for those from agencies with smaller caseloads. This finding supports the possibility that agencies with smaller caseload may be able to dedicate more resources to find alternative permanency placements for children than agencies with high caseloads. Also, the interaction of child age at entry and agency use of non-family placements showed that, for younger children, the faster speed to guardianship or custody was for those from agencies with the highest use of non-family placement. However, for older children, those from agencies with lower use of non-family placements had faster speeds of guardianship or custody. This finding should be interpreted with caution, since very few younger children should be placed in non-family settings such as group homes. Looking particularly at how the finding which demonstrated faster guardianship or custody for older children when there is lower use of non-family placement, this may be attributed to increased opportunities for guardianship or custody when children are placed in family settings which evolve into these permanency options. Lastly, the interaction of child age at entry and agency engagement in alternative response was significantly related to speed of guardianship or custody. In general, the speed of guardianship or custody increased with age. The difference between children from agencies engaged in alternative response and those from agencies who were not engaged in alternative response was greatest at younger ages and gradually converged, with the faster times to guardianship or custody for those from agencies not engaged in alternative response. This finding may in part be due to the fact that agencies engaged in alternative response have caseloads with only the most severe maltreatment cases, as opposed to agencies not engaged in alternative response, which have more of a mixture of cases, including some less severe cases that may be able to achieve guardianship or custody more quickly.

Implications

These findings lead to several implications which can potentially influence several aspects of child welfare, including policy and practice, agency performance measurement, as well as research and methods. The identification of specific child, agency, and county characteristics related to each type of permanency outcome can inform child welfare policymakers and practitioners about disproportionality among a variety of child and county-level factors. Those characteristics identified as significantly related to achievement of permanency can shape policy and practice to address those children who are most in need and most in danger of lingering in foster care for prolong periods of time. In addition, this study was implemented to better understand how variation of local child, agency, and county factors may influence achievement of federal, state, and local permanency performance measures. As identified by this research, certain child and county-level characteristics are related to particular permanency outcomes. Federal performance measures could be revised to account for differences in local variability. Also, state and local child welfare agencies may be able to obtain a deeper understanding of performance by assessing performance measures according to subcategories of these related factors, allowing agencies to identify targeted populations or areas needing additional attention or resources for improvement. Furthermore, there are currently very few studies that have applied multi-level analytical approaches to the evaluation of child welfare data, where children are nested within local agencies or communities (Brown, 2005; Coulton, Korbin, & Su, 1999; Drake et al. 2006), and only two studies that applied a competing risks analytical framework (McDonald et al., 2007; Testa & Slack, 2002). This study is the first to combine both multilevel survival

analysis with a competing risks framework, demonstrating the need to reconsider traditional approaches to analyzing child welfare data.

Policy and Practice

The study findings identifying certain child, agency, and county characteristics as being significantly related to permanency outcomes can be very beneficial to child welfare policymakers and practitioners. Understanding differences in time to achieve permanency among subgroups of children can help shape policy and practice to target efforts for those children who are at greater risk of having longer periods of time in foster care before achieving permanency.

Specifically, children of different ages, genders, races, ethnicities, and reasons for placement were all associated with differences in time to achieve permanency outcomes. In particular, child age at entry was found to be associated with timely reunification, adoption, and emancipation. Children who entered care at older ages had faster achievement of reunifications yet slower achievement of adoptions. This information can support age-specific efforts to promote adoptions for adolescents or stronger reunification efforts for younger children. Also, gender differences were also identified, where females had slower speeds of reunification and males had slower speeds of achieving adoption. These findings may inform child welfare workers about gender differences and how to work with males and females to expedite more timely achievement of permanency. In addition, the results regarding racial differences, where children of color consistently had slower rate of achieving permanency, is an important factor in trying to understand and develop strategies to try and reduce disproportionality of children in foster care. Knowing children of color have slower rates to adoption, for example, can support policies that promote adoption for children of

color and focus recruitment of adoptive families. Also, differences in achievement of permanency in regard to Hispanic ethnicity showed that Hispanic children had a cultural advantage, since they were able to achieve reunification at a quicker rate. These findings from assessing race and ethnicity separately can inform policymaker and practitioners about challenges and advantages when trying to help subpopulations of children achieve permanency. Also, the results regarding reasons children entered placement are beneficial to understanding the dynamics of achievement of permanency outcomes for children, since the vast majority of children enter care due to neglect, which was shown to be associated with slower times to reunification and adoption. Knowing these results for child characteristics can promote a better understanding of experiences of subpopulations of children within foster care and help facilitate strategies to improve timely achievement of permanency outcomes for those demonstrating slower rates of achieving permanency.

The results of this study also highlighted the importance of several child welfare agency characteristics that are related to children's timely achievement of permanency. Looking at child characteristics in conjunction with agency factors provides a more comprehensive understanding of not only what child factors may influence achievement of permanency, but also what agency factors may promote or inhibit timely permanency. When trying to identify areas of policy or practice to improve to help facilitate better achievement of outcomes, understanding what characteristics of the agency are related to achieving permanency for children is a valuable set of information that can help focus reform efforts on aspects of the agency itself. In particular, in regard to size of agency's foster care caseload, the study results showed that as agency caseload size increases, the speed of achieving reunification and achieving guardianship or custody decreases. This finding may assist

agencies of all sizes to better understand how their caseload sizes with associated workloads and resources may be related to achievement of permanency outcomes. Knowing that caseload size is related to achievement of permanency outcome, these findings may provide further evidence for the need for state and local agencies to evaluate the connections between the needs of their caseload and the abilities of their child welfare workforce to meet those needs. Also, agency use of certain types of placements were found to be related to achieving permanency, specifically agency use of relative placements, which is highly regarded as good practice. Understanding how use of particular types of placements may be associated with faster or slower achievement of permanency is an important consideration when trying to balance efforts to promote good practice while simultaneously trying to achieve timely permanency outcomes. For example, higher use of relative placements promotes faster times to reunification and guardianship or custody yet slows time to adoption. However, if using increased levels of relative placements promotes children remaining in a safe and stable environment with their biological family or relatives, then it should be considered good practice despite the association it has with delaying adoptions, prompting the need to use agency contextual factors to assist in interpreting achievement of outcomes. Furthermore, agency engagement in alternative response or prior child welfare reform efforts were associated with timely achievement of permanency. Although some of these efforts may try to reform practice, these efforts may promote increased speeds to achieving some outcomes while inadvertently contributing to slower speeds of achieving other forms of permanency. Therefore, these results promote the need for agency policymakers to always assess influence of various reform efforts within a broad context of factors and outcomes to have a more holistic understanding of the impact of these efforts.

In demonstrating the need to assess achievement of child permanency outcomes within a broader context, this study provided evidence for why county characteristics in addition to agency factors and child characteristics should be included in evaluating permanency outcomes. Specifically, both county poverty and unemployment were associated with achievement of timely permanency. Although in theory poverty and unemployment tend to go hand-in-hand, they each were related to achievement of permanency differently. In particular, increasing poverty slowed the speed of adoptions, while increasing unemployment increased speed of reunifications. These findings emphasize the need to include the influence of these local community conditions, when trying to develop policies and adapt practice to promote permanency in locations that are struggling with high levels of poverty and unemployment.

Knowing how each of these child, agency, and county characteristics are related to either faster or slower times to specific types of permanency is extremely valuable to inform both policy and practice. This study provide evidence of how the child as well as their environment influence successful achievement of permanency, and these contextual factors should be included when considering potential reforms to improve child welfare policy and practice.

Performance Measurement

The fundamental purpose of conducting this research was to better understand how local variation of child, agency, and county factors may influence achievement of permanency performance measures for both state and local child welfare agencies. This research provided a much needed assessment of how variation of child, agency, and county characteristics relate to faster or slower achievement of reunification, adoption, guardianship

or custody, and emancipation. Knowing that certain subpopulations of children as well as agency and county conditions are associated with slower achievement of permanency, agency improvement efforts can more easily target are those children and agencies most in-need of assistance.

The significance of the relationships between child, agency, and county characteristics and achievement of permanency emphasizes the importance of accounting for these contextual factors when assessing agency performance. Specifically, this research found that the child's age at entry was significantly related to timely achievement of permanency. Child's age at entry led to differences in children's experiences in foster care and how quickly they achieve permanency. Because of this strong relationship between age and permanency, the competing risks analysis was stratified by children's age groups and demonstrated how the dynamics of relationships among child, agency, and county characteristics differed across age groups. These findings clearly support a need to consider stratifying child welfare agency performance measures by age group, which could improve both the federal CFSR measures as well as alternative state or local measures used for self-evaluation. Although there have been a few localized efforts to estimate child welfare performance measures according to children's age groups (Duncan et al., 2008; Needell et al., 2008), the federal CFSR measures do not factor in how children's age contributes to differences in achievement of outcomes when evaluating agency performance.

Furthermore, this research supports the need to stratify performance measures by other characteristics in addition to children's age at entry. The results of this research demonstrate how numerous child, agency, and county characteristics are significantly related to achievement of timely permanency outcomes, which should not be ignored when

evaluating agency performance. By estimating performance measures broken down into subgroups of categories based on significant child, agency, and county factors, the state and local agencies will get a better idea of which children and agencies are having the most difficulty in achieving performance standards. Although the federal CFSR measures do not assess subpopulations based on child or local factors, a few of the state and university efforts that have stratified performance measures by age have also stratified by other factors, such as child gender, race, and ethnicity (Duncan et al., 2008; Needell et al., 2008). However, this research provides a much needed evidence base to support why stratifying performance measures by child as well as agency and county characteristics is necessary and beneficial to understanding agency performance. Although it would be infeasible to propose that federal performance measures should be stratified by every significant child, agency, and county characteristic, this research emphasizes the need to at least identify a few key factors, such as child age and race, that would be most important for stratifying federal accountability measures. Although it is not recommended that official performance measures be stratified by all significant characteristics, it would be beneficial for state and local child welfare agencies to proactively assess their performance by subcategories of many of these significant factors and include this as part of their self evaluation efforts and as part of their efforts to identify subpopulations and agencies to target improvement efforts. Ultimately it would be beneficial to identify a statistical threshold of effect size to determine which factors play a large role and should be included in the estimation of outcome measures, however further research is needed to assess these relationships among a more diverse sample of states and localities before any selection criteria could be recommended.

Another potential contribution of this research may be to explore the possibility of risk-adjusted performance measures. Risk-adjusted performance measures assess levels of performance by taking into account the types of populations served and conditions under which those agencies must operate. Although risk-adjusted performance assessment is more widely used in the health care field, there are early attempts to assess its potential in the field of child welfare (McMillen, Lee, & Jonson-Reid, 2008). However these early efforts have only assessed the application of risk-adjusted performance measures to assessing performance of mental health provides or contracted private service providers. By understanding specifically how certain child, agency, and county conditions influence each permanency outcome, there may be potential for including this information when estimating federal, state, or local performance measures, so that despite local variation, performance can be assessed more equally across jurisdictions using a risk-adjusted approach. Following a similar rationale, the current composite scores for the federal CFSR take into consideration the population size of each county in estimating performance measures, however this research provides evidence that there are many additional factors that could be considered and incorporated into a more comprehensive methodology for risk-adjusted federal measures.

Methods and Research

In addition to the important implications for policy and practice as well as advancing performance measurement of child welfare agencies, this study provides useful contributions to the field in regard to methodological approaches in child welfare research. This research was one of a small but growing number of studies that have applied a multilevel survival approach to child welfare data (Brown, 2005; Drake et al., 2006; Guo & Wells, 2003). Given the nested structure of child welfare data, where children are nested within families and

children are nested with local child welfare agencies, using multilevel survival methods appears to be the most appropriate methodological approach to evaluate achievement of longitudinal outcomes in child welfare. This study provided strong evidence of the necessity of using multilevel survival methods by comparing the results of corrective-Cox models and naïve Cox models, which demonstrated that naïve models produced many incorrect findings by falsely identifying factors as significant and failing to identify significant factors. The results of this study support the need for researchers to use a multilevel survival approach to help control for autocorrelation of child welfare data.

Moreover, this study was the first to combine both multilevel survival analysis with a competing risks framework. Although only a few studies have previously applied a competing risks analytical framework in the field of child welfare (McDonald et al., 2007; Testa & Slack, 2002), these studies did not use multilevel methods in their analysis. Having demonstrated the need to use multilevel survival methods with child welfare data, applying this method within a competing risks framework was the next logical step in the analysis. Because children can only achieve one type of permanency exit from foster care, the achievement of different permanency types and the difference in time to achieve each type of permanency is perfectly fitted for a competing risks analysis. This analytical framework allows for simultaneous comparison of how each covariate relates to each type of permanency outcome, allowing for the identification of similarities and differences across outcome type. The results of this research demonstrate the importance and benefits of applying the methodological approach of a competing risks framework to child welfare research.

Limitations of Study

As with all research, there are several limitations with this study that should be acknowledged. Although this study provides extremely useful information regarding the relationship of child, agency, and county factors and timely achievement of permanency outcomes, this research relies only on information from one state. This dynamics of the relationships of the covariates and outcomes need to be further assessed to determine if these findings are only applicable to North Carolina or can be more broadly used for all state and local child welfare agencies.

Additionally, this study utilized administrative data, which was collected for purposed other than research. Limitations of using administrative data need to be acknowledged, such as inaccurate or missing data due to problems or delays with data entry. Also, information used in this study was limited to the variables that were available in the child welfare administrative data. Ideally, more information would be useful regarding parent and caretaker characteristics, service use, and participation in other social programs. In addition, reliance on county data from the U.S. Census, Bureau of Labor Statistics, and Department of Justice limited the measures of poverty, unemployment, and crime to the definitions used by those agencies. Also, the information about the characteristics of the county child welfare agencies was limited to what information could be obtained from the NC-DSS staffing survey, the child welfare administrative data, and knowledge about their participation in reform efforts. Ideally, additional measures about the agency characteristics, policies, and practices as well as measures about different aspects of organizational climate, culture, and structure would be a beneficial addition to this research.

Because this study assessed achievement of timely permanency outcomes, it is important to assert an important caveat related to the general assumption that achieving permanency as quickly as possible is a desirable outcome for children. Spending less time in foster care and achieving a safe and permanent placement are generally regarded as positive outcomes for children involved in the child welfare system. However, it is essential to note that it is not always beneficial to pursue permanency quickly, since many cases often require a substantial length of time to ensure necessary services are provided and resources are in place so the child can exit to a permanent placement. Additional information about post-permanency outcomes, such as recurrence of maltreatment and reentry into foster care, would contribute to a better, more comprehensive understanding of successful achievement of permanency. For this reason, it is important not to assess outcomes in isolation, since expediting permanency for the sake of meeting mandated timeframes can potentially lead to jeopardizing child safety.

Similarly, the results regarding timeliness to achieve emancipation need to be interpreted with caution. Technically emancipation is a way to exit foster care but it is not considered a desirable permanency exit. More importantly, the time in which adolescents achieve emancipation predominately depends on their age and the time they enter care until they reach the age of 18. This research provides some insight into the characteristics related to achievement of emancipation, but the time to achieve emancipation should always be viewed within the context that achievement of this outcome is age-specific and faster or slower achievement is based on their length of time in care.

As with all studies, this research is limited in that it can only provide information about those characteristics and outcomes that were measured and included in this study.

There are many more unmeasured factors that might influence the achievement of permanency outcomes, however this research can only provide insight regarding those that were included in the analysis. Despite these limitations, this research has provide a better understanding of relationships between permanency outcomes and child, agency, and county factors that have important implications for child welfare policy, practice, research, and agency performance measurement.

Directions for Future Research

This research attempted to provide much-needed evidence regarding child, agency, and county contextual factors affecting the performance of child welfare agencies in achieving timely permanency. This study only begins to answer some of the questions regarding understanding how to assess performance and improve agency achievement of positive outcomes for children. One of the most obvious directions for future research would be to replicate this study with data from several states to further evaluate the relationships of child, agency, and county factors with achieving permanency. By evaluating how various factors affect the achievement of permanency across several states, more comparisons can be made among different types of child welfare systems, such as county- versus state-administered systems, and agency use of privatization and contracted services.

Although this research revealed a variety of significant relationships between contextual factors and permanency, future research should continue to evaluate the relationship of other important child, agency, and county factors. Specifically, this study provides new insights concerning child welfare performance measurement, specifically how agency characteristics and policy are related to achievement of child outcomes. More research is needed to assess the impact of agency factors for which original data may be

required, such as the characteristics and education of the agency caseworkers, training of caseworkers, worker caseloads, agency culture and climate, and agency access to services as well as foster and adoptive homes. Similarly, additional county contextual factors could be assessed, including local access to services and transportation. Future research using county characteristics should consider obtaining information from other administrative data sources and linking this information to the child welfare data. Also, future research should evaluate other individual-level characteristics in regard to aching permanency, such the severity of maltreatment, the relationship of the perpetrator, and parental characteristics. Furthermore, additional research should be done to assess other outcomes of interest, such as safety outcomes, placement stability, and post-permanency outcomes.

In regard to methodology, this study demonstrates that researchers should carefully evaluate autocorrelation and competing risks in evaluating child welfare outcomes. The use of multilevel methods is appropriate when evaluating outcomes for children nested within local child welfare agencies. As demonstrated with this study, applying inappropriate methods to multilevel data could result in misleading finding, which could have dire consequences if that information were to be used to change policy and practice.

Lastly, this study was conducted to add to the evidence base for child welfare performance measurement. Much more research is needed to help advance the methods and approaches used to assess child welfare agency performance. This research should encourage other researchers to account for the influence of contextual factors when evaluating performance, but more research is needed to better understand these relationships and how to incorporate the effects of theses contextual factors. More research is needed to assess not only what factors may be beneficial to stratify performance measures to assess subcategories

of child, agency, and county factors, but also the possibility of the application of risk-adjusted performance measures in child welfare. Performance measurement and accountability in child welfare has been growing rapidly in recently years, so there is an essential need for rigorous research on how to better understand and advance child welfare performance measures.

Appendix

Table I

Sample characteristics

Sample characteristics		n	%	mean	SD
Individual-level characteristics		22,316	100%		
Entry cohort:	CY 2002	5237	23.47%		
	CY 2003	5260	23.57%		
	CY 2004	5877	26.34%		
	CY 2005	5942	26.63%		
Age at entry (continuous)		22316		6.77	5.56
Age at entry:	0 to 1	5746	25.75%		
	2 to 12	11417	51.16%		
	13 to 18	5153	23.09%		
Gender:	Male	11063	49.57%		
	Female	11253	50.43%		
Race:	White	10837	48.56%		
	Children of color	11478	51.44%		
Ethnicity:	Hispanic	1879	8.42%		
	Non-Hispanic	20437	91.58%		
Reason for placement:	Abuse	2930	13.13%		
	No abuse	19,386	86.87%		
Reason for placement:	Neglect	17,989	80.61%		
	No neglect	4327	19.39%		
Able to achieve exit from foster care within 3 years:	Exited from foster care	19,024	85.25%		
	Did not yet exit from foster care	3,292	14.75%		
Type of foster care exit achieved, if exited within 3 years: (n=19,024)					
	Reunification	8248	43.36%		
	Adoption	3395	17.85%		
	Guardianship/ custody	5504	28.93%		
	Emancipation	669	3.52%		
	Other type of exit	1208	6.35%		
County Child Welfare Agency characteristics		100	100%		
Number of children from sample in each county		100		223.16	277.18

Sample characteristics		n	%	mean	SD
Size of foster care caseload:	CY 2002	100		157.22	229
	CY 2003	100		155.28	216
	CY 2004	100		162.16	228
	CY 2005	100		171.56	232
% social work turnover:	CY 2002	95		23.73%	18.15
	CY 2003	96		27.35%	20.73
	CY 2004	100		32.6%	19.54
	CY 2005	100		30.43%	19.26
% use of relative placements:	CY 2002	100		24.22%	10.1
	CY 2003	100		22.99%	9.41
	CY 2004	100		24.35%	10.48
	CY 2005	100		24.05%	10.6
% use of non-family placements:	CY 2002	100		16.65%	8.54
	CY 2003	100		17.01%	9.03
	CY 2004	100		15.91%	8.81
	CY 2005	100		14.9%	7.26
Engaged in alternative response:	CY 2002	10	10%		
	CY 2003	52	52%		
	CY 2004	52	52%		
	CY 2005	52	52%		
Family court available:	CY 2002	16	16%		
	CY 2003	16	16%		
	CY 2004	17	17%		
	CY 2005	18	18%		
History of reform efforts		45	45%		
County Characteristics		100	100%		
% urban		100		34.85%	27.72
% individuals living in poverty	CY 2002	100		14.55%	3.82
	CY 2003	100		14.62%	3.31
	CY 2004	100		15.12%	3.52
	CY 2005	100		16.86%	4.93
% unemployed:	CY 2002	100		7.18%	1.63
	CY 2003	100		6.89%	1.57
	CY 2004	100		5.94%	1.4
	CY 2005	100		5.71%	1.28
Number of violent crimes per 1,000:	CY 2002	98		3.35	2.26
	CY 2003	98		3.19	2.16
	CY 2004	98		3.29	2.15
	CY 2005	97		3.46	2.09

Table II

Median length of time (in days) in foster care to achieve permanency outcome by exit type

		Time to reunification			Time to adoption			Time to guardianship/ custody			Exit to emancipation		
Sample characteristics		n	Median length of time	95% CI	n	Median length of time	95% CI	n	Median length of time	95% CI	n	Median length of time	95% CI
Individual-level characteristics													
All children		8248	278	(268, 282)	3395	707	(693, 720)	5504	279	(272, 286)	669	605	(568, 639)
Age at entry:	0 to 1	1672	293	(279, 310)	1908	652	(640, 667)	1289	287	(269, 302)	-	-	-
	2 to 12	4411	295	(287, 306)	1469	766	(756, 779)	3135	280	(267, 287)	-	-	-
	13 to 18	2165	221	(204, 234)	117	652	(589, 703)	1080	266	(244, 290)	669	605	(568, 639)
Gender:	Male	4135	280	(273, 292)	1684	704	(685, 723)	2714	274	(262, 286)	261	634	(575, 703)
	Female	4113	270	(259, 280)	1711	711	(693, 724)	2790	283	(272, 294)	408	577	(547, 633)
Race:	White	3976	270	(259, 280)	1815	675	(659, 687)	2724	274	(263, 287)	319	588	(530, 646)
	Children of color	4272	282	(272, 293)	1580	745	(730, 757)	2780	282	(272, 293)	350	623	(569, 667)
Ethnicity:	Hispanic	865	237	(215, 261)	269	725	(686, 756)	342	248	(225, 282)	37	453	(221, 570)
	Non-Hispanic	7383	280	(272, 286)	3126	705	(691, 718)	5162	280	(272, 188)	632	623.5	(575, 653)

Sample characteristics		Time to reunification n	Median length of time	95% CI	Time to adoption n	Median length of time	95% CI	Time to guardianship/ custody n	Median length of time	95% CI	Exit to emancipation n	Median length of time	95% CI
Reason for placement:	Abuse	1197	289	(266, 304)	305	745	(693, 778)	664	293	(273, 324)	82	537	(432, 658)
	No abuse	7051	275	(266, 281)	3090	704	(690, 716)	4840	276	(266, 286)	587	620	(574, 648)
Reason for placement:	Neglect	6401	295	(288, 301)	2882	724	(713, 735)	4604	280	(272, 287)	400	575	(547, 637)
	No neglect	1847	182	(175, 200)	513	571	(545, 609)	900	270.5	(250, 293)	269	632	(586, 682)
County Child Welfare Agency characteristics													
Size of foster care caseload:	Q1: ≤ 42	331	204	(184, 241)	111	667	(602, 726)	283	319	(282, 349)	29	656	(565, 818)
	Q2: > 42, ≤ 88	1082	216	(194, 238)	343	631	(594, 661)	602	217	(202, 249)	79	647	(560, 712)
	Q3: > 88, ≤ 185	1888	233	(216, 246)	629	708	(684, 738)	1195	244	(228, 263)	157	632	(553, 735)
	Q4: > 185	4947	313	(301, 321)	2312	721	(707, 732)	3424	294	(287, 307)	404	574.5	(537, 624)

Sample characteristics		Time to reunification			Time to adoption			Time to guardianship/ custody			Exit to emancipation		
		n	Median length of time	95% CI	n	Median length of time	95% CI	n	Median length of time	95% CI	n	Median length of time	95% CI
% social work turnover:	Q1: ≤ 14.3%	1768	268.5	(250, 288)	607	687	(658, 726)	1197	265	(257, 279)	107	595	(515, 664)
	Q2: > 14.3%, ≤ 27%	2625	296	(285, 309)	1418	733	(722, 755)	1719	301	(286, 315)	246	610	(553, 697)
	Q3: > 27%, ≤ 40%	2021	245	(227, 268)	733	676	(653, 697)	1257	262	(245, 282)	171	609	(532, 677)
	Q4: > 40%	1834	276	(261, 287)	637	682	(663, 718)	1331	280	(261, 296)	145	614	(510, 663)
% use of relative placements:	Q1: ≤ 17.325 %	1665	266	(249, 282)	892	672.5	(650, 691)	1235	249	(238, 264)	165	646	(579, 701)
	Q2: > 17.325 %, ≤ 22.02%	2369	315	(294, 328)	1096	724	(703, 738)	1363	301	(285, 317)	213	598	(557, 659)
	Q3: > 22.02%, ≤ 28.57%	2511	258	(241, 272)	958	725.5	(705, 750)	1616	283	(265, 298)	178	584	(538, 662)
	Q4: > 28.57%	1703	251	(237, 272)	449	694	(658, 728)	1290	273.5	(261, 293)	113	529	(447, 647)

		Time to reunification			Time to adoption			Time to guardianship/ custody			Exit to emancipation		
Sample characteristics		n	Median length of time	95% CI	n	Median length of time	95% CI	n	Median length of time	95% CI	n	Median length of time	95% CI
% use of non-family placements:	Q1: ≤ 9.765%	1375	216	(202, 232)	542	690.5	(661, 723)	977	260	(238, 276)	97	638	(484, 708)
	Q2: > 9.765% , ≤ 15.72%	2452	276.5	(259, 294)	936	755.5	(735, 769)	1622	281	(265, 293)	199	589	(553, 639)
	Q3: > 15.72% , ≤ 20.64%	2602	289	(280, 305)	1177	701	(683, 723)	1610	289.5	(273, 309)	203	575	(515, 656)
	Q4: > 20.64%	1819	293	(280, 302)	740	658	(641, 683)	1295	280	(262, 295)	170	653	(539, 706)
Engaged in alternative response:	Yes	3747	291	(280, 301)	1963	714	(699, 727)	2409	282	(271, 297)	337	623	(575, 649)
	No	4501	262	(249, 275)	1432	693.5	(679, 716)	3095	277	(265, 286)	332	573.5	(532, 654)
Family court available:	Yes	2732	280	(266, 294)	1220	726.5	(711, 751)	1772	293	(277, 308)	218	564.5	(470, 637)
	No	5516	274.5	(265, 282)	2175	694	(683, 711)	3732	273	(262, 283)	451	626	(577, 659)
History of reform efforts:	Yes	5838	280.5	(274, 289)	2674	711	(694, 723)	3871	281	(272, 290)	481	579	(552, 625)
	No	2410	259	(241, 276)	721	694	(678, 723)	1633	273	(255, 288)	188	658.5	(568, 715)

Sample characteristics		Time to reunification n	Time to reunification Median length of time	Time to reunification 95% CI	Time to adoption n	Time to adoption Median length of time	Time to adoption 95% CI	Time to guardianship/ custody n	Time to guardianship/ custody Median length of time	Time to guardianship/ custody 95% CI	Exit to emancipation n	Exit to emancipation Median length of time	Exit to emancipation 95% CI
County Characteristics													
% individuals living in poverty:	Q1: ≤ 12.60%	2626	301.5	(293, 316)	1277	724	(704, 741)	1584	281.5	(265, 300)	224	567	(507, 605)
	Q2: > 12.60%, ≤ 14.70%	2558	286.5	(280, 300)	1208	673	(651, 687)	1616	302	(283, 317)	215	653	(609, 700)
	Q3: > 14.70%, ≤ 17.50%	1812	227	(208, 242)	606	727	(703, 747)	1289	251	(235, 267)	124	617	(516, 683)
	Q4: > 17.50%	1252	241	(219, 264)	304	729.5	(688, 762)	1015	282	(260, 296)	106	578	(529, 715)
% unemployed:	Q1: ≤ 5.20%	2317	335	(321, 345)	1036	746	(723, 761)	1435	311	(290, 324)	215	605	(553, 647)
	Q2: > 5.20%, ≤ 6.30%	2754	281	(270, 295)	1206	707	(686, 724)	1985	267	(258, 283)	222	625	(552, 690)
	Q3: > 6.30%, ≤ 7.40%	1628	225	(209, 241)	611	705	(676, 730)	1116	282	(265, 297)	135	565	(445, 658)
	Q4: > 7.40%	1549	224	(204, 242)	542	639	(614, 670)	968	253.5	(238, 276)	97	623	(526, 716)
Number of violent crimes per 1,000:	Q1: ≤ 1.79	1082	228.5	(210, 245)	375	682	(651, 719)	534	263	(231, 285)	83	539	(414, 633)
	Q2: > 1.79, ≤ 2.95	1796	280.5	(265, 293)	802	670.5	(647, 686)	1224	283.5	(265, 301)	152	572	(507, 639)
	Q3: > 2.95, ≤ 4.21	1841	246	(229, 266)	944	713	(688, 730)	1279	250	(238, 272)	153	647	(580, 702)
	Q4: > 4.21	3529	306	(295, 317)	1274	736	(715, 754)	2467	293	(281, 308)	281	620	(560, 690)

Table III

Corrective-Cox models for time to reunification

	Time to Reunification					
Total sample	21,913					
Number (%) achieving reunification	8086 (36.90%)					
Number (%) censored	13827 (63.10%)					
	Model 1 - Main effects			Model 2 - Main effects & crosslevel interactions		
Sample characteristics	Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio	
Individual-level characteristics:						
Age at entry	0.02695	1.027	****	0.01973	1.02	****
Female	-0.04158	0.959	*	-0.04053	0.96	*
Children of color	-0.06483	0.937		-0.06547	0.937	
Hispanic ethnicity	0.41359	1.512	****	0.40942	1.506	****
Reason for placement - abuse	0.0924	1.097		0.09367	1.098	
Reason for placement - neglect	-0.020968	0.811	****	-0.20887	0.811	****
County Child Welfare Agency characteristics:						
Number of children in foster care caseload (in units of 100)	-0.04047	0.96	**	-0.04124	0.96	**
% social work turnover	-0.0007042	0.999		-0.000717	0.999	
% use of relative placements	0.00791	1.008	*	0.00801	1.008	*
% use of non-family placements	-0.00174	0.998		-0.00145	0.999	
Engaged in alternative response	-0.0805	0.923		-0.08155	0.922	
Family court available	0.09765	1.103		-0.05979	0.942	
History of reform efforts	0.02929	1.03		0.03199	1.033	
County Characteristics:						
% individuals living in poverty	-0.00802	0.992		-0.00801	0.992	
% unemployed	0.05098	1.052	*	0.05043	1.052	*
Number of violent crimes per 1,000	0.02279	1.023		0.02315	1.023	
Cross-level interactions:						
Child age at entry x Family court available	-			0.0213	1.022	***
Wald chi-square	249.25****			282.8****		
df	16			17		
* p<.05, ** p<.01, *** p<.001, **** p<.0001						
Note: Standard errors estimated by a robust LWA estimator.						

Table IV

Corrective-Cox models for time to adoption

	Time to adoption					
Total sample	21,913					
Number (%) achieving adoption	3350 (15.29%)					
Number (%) censored	18,563 (84.71%)					
Sample characteristics	Model 1 - Main effects			Model 2 - Main & crosslevel interactions		
Individual-level characteristics	Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio	
Age at entry	-0.17171	0.842	****	-0.21524	0.806	****
Female	0.07364	1.076	*	0.07115	1.074	*
Children of color	-0.44074	0.644	****	-0.35097	0.704	****
Hispanic ethnicity	0.12886	1.138		0.10004	1.105	
Reason for placement - abuse	-0.3176	0.728	**	-0.31768	0.728	**
Reason for placement - neglect	-0.31366	0.731	***	-0.30701	0.736	***
County Child Welfare Agency characteristics						
Number of children in foster care caseload	-0.026	0.974		-0.02488	0.975	
% social work turnover	-0.000748	0.999		-0.0006681	0.999	
% use of relative placements	-0.00838	0.992		-0.0142	0.986	*
% use of non-family placements	0.00164	1.002		0.00134	1.001	
Engaged in alternative response	0.18155	1.199		0.18759	1.206	
Family court available	0.1322	1.141		0.25033	1.284	
History of reform efforts	0.3653	1.441	**	0.3446	1.411	**
County Characteristics						
% individuals living in poverty	-0.03376	0.967	*	-0.03469	0.966	*
% unemployed	0.0665	1.069		0.06444	1.067	
Number of violent crimes per 1,000	-0.0283	0.972		-0.02562	0.975	
Cross-level interactions						
Child age at entry x Use of relative placement				0.00201	1.002	**
Child race x Family court available				-0.2537	0.776	*
Wald chi-square	1506.45****			1840.05****		
df	16			18		
* p<.05, ** p<.01, *** p<.001, **** p<.0001						
Note: Standard errors estimated by a robust LWA estimator.						

Table V

Corrective-Cox models for time to guardianship/custody

	Time to guardianship/custody				
Total sample	21,913				
Number (%) achieving guardianship/ custody	5408 (24.68%)				
Number (%) censored	16,505 (75.32%)				
Sample characteristics	Model 1 - Main effects			Model 2 - Main & crosslevel interactions	
Individual-level characteristics	Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio
Age at entry	0.00418	1.004		0.00646	1.006
Female	0.00791	1.008		0.00951	1.01
Children of color	-0.7606	0.927		-0.0775	0.925
Hispanic ethnicity	-0.15626	0.855		-0.15983	0.853
Reason for placement - abuse	-0.07022	0.932		-0.06942	0.933
Reason for placement - neglect	0.08762	1.092		0.08709	1.091
County Child Welfare Agency characteristics					
Number of children in foster care caseload	-0.0286	0.972		-0.04331	0.958 *
% social work turnover	-0.0006171	0.999		-0.0005888	0.999
% use of relative placements	0.01133	1.011		0.01138	1.011
% use of non-family placements	0.00165	1.002		0.00944	1.009
Engaged in alternative response	-0.13375	0.875		-0.23754	0.789 *
Family court available	0.013	1.013		0.00772	1.008
History of reform efforts	0.06528	1.067		0.07007	1.073
County Characteristics					
% individuals living in poverty	0.03039	1.031	***	0.03104	1.032 ***
% unemployed	-0.01125	0.989		-0.0129	0.987
Number of violent crimes per 1,000	0.00773	1.008		0.00752	1.008
Cross-level interactions					
Child age at entry x Agency caseload size				0.00209	1.002 ***
Child age at entry x Agency use of non-family placement				-0.00111	0.999 **
Child age at entry x Agency engaged in alternative response				0.01577	1.016 *
Wald chi-square	117.9****			139.29****	
df	16			19	
* p<.05, ** p<.01, *** p<.001, **** p<.0001					
Note: Standard errors estimated by a robust LWA estimator.					

Table VI

Comparison of corrective-Cox models with naïve Cox models for time to reunification, adoption, and guardianship/custody

	Time to reunification				**Time to adoption**				**Time to guardianship/custody**			
			Corrective-Cox (LWA) model	Naïve Cox model			Corrective-Cox (LWA) model	Naïve Cox model			Corrective-Cox (LWA) model	Naïve Cox model
Sample characteristics	Parameter estimate	Hazard Ratio	p-value	p-value	Parameter estimate	Hazard Ratio	p-value	p-value	Parameter estimate	Hazard Ratio	p-value	p-value
Individual-level characteristics:												
Age at entry	0.02695	1.027	<.0001****	<.0001****	-0.17171	0.842	<.0001****	<.0001****	0.00418	1.004	0.3774	0.1008
Female	-0.04158	0.959	0.0378*	0.0646	0.07364	1.076	0.0207*	0.0377*	0.00791	1.008	0.7738	0.772
Children of color	-0.06483	0.937	0.1222	0.0123*	-0.44074	0.644	<.0001****	<.0001****	-0.7606	0.927	0.1664	0.0140*
Hispanic ethnicity	0.41359	1.512	<.0001****	<.0001****	0.12886	1.138	0.1338	0.06272	-0.15626	0.855	0.077	0.0082**
Reason for placement - abuse	0.0924	1.097	0.0662	0.0040**	-0.3176	0.728	0.0011**	<.0001****	-0.07022	0.932	0.2507	0.0857
Reason for placement - neglect	-0.020968	0.811	<.0001****	<.0001****	-0.31366	0.731	0.0001***	<.0001****	0.08762	1.092	0.1234	0.0233*
County Child Welfare Agency characteristics:												
Number of children in foster care caseload (units of 100)	-0.04047	0.96	0.0076**	<.0001****	-0.026	0.974	0.2842	0.0011**	-0.0286	0.972	0.0794	<.0001****
% social work turnover	-0.000704	0.999	0.6756	0.3461	-0.00075	0.999	0.7992	0.5671	-0.00062	0.999	0.7719	0.4899
% use of relative placements	0.00791	1.008	0.0418*	<.0001****	-0.00838	0.992	0.2232	0.0067**	0.01133	1.011	0.075	<.0001****
% use of non-family placements	-0.00174	0.998	0.672	0.3689	0.00164	1.002	0.8311	0.6162	0.00165	1.002	0.8108	0.4788
Engaged in alternative response	-0.0805	0.923	0.1818	0.0021**	0.18155	1.199	0.0877	<.0001****	-0.13375	0.875	0.0897	<.0001****

	Time to reunification				Time to adoption				Time to guardianship/custody			
Sample characteristics	Parameter estimate	Hazard Ratio	Corrective-Cox (LWA) model p-value	Naïve Cox model p-value	Parameter estimate	Hazard Ratio	Corrective-Cox (LWA) model p-value	Naïve Cox model p-value	Parameter estimate	Hazard Ratio	Corrective-Cox (LWA) model p-value	Naïve Cox model p-value
Family court available	0.09765	1.103	-0.2114	0.0009***	0.1322	1.141	0.3926	0.0048**	0.013	1.013	0.9021	0.7153
History of reform efforts	0.02929	1.03	0.6702	0.3134	0.3653	1.441	0.0042**	<.0001****	0.06528	1.067	0.519	0.0608
County Characteristics:												
% individuals living in poverty	-0.00802	0.992	0.4823	0.0562	-0.03376	0.967	0.0409*	<.0001****	0.03039	1.031	0.0007***	<.0001****
% unemployed	0.05098	1.052	0.0283*	<.0001****	0.0665	1.069	0.0805	<.0001****	-0.01125	0.989	0.6747	0.3195
Number of violent crimes per 1,000	0.02279	1.023	0.2401	0.0020**	-0.0283	0.972	0.4226	0.0281*	0.00773	1.008	0.7442	0.3743

* p<.05, ** p<.01, *** p<.001, **** p<.0001

Table VII

Competing risks LWA analysis for achieving permanency outcomes for children ages 0 to 1

Sample characteristics (n=5648)	**Time to Reunification**			**Time to Adoption**			**Time to Guardianship/Custody**		
Number (%) achieving type of exit	1642 (29.07%)			1790 (31.69%)			1264 (22.38%)		
Number (%) censored	4006 (70.93%)			3858 (68.31%)			4384 (77.62%)		
	Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio	
Individual-level characteristics									
Age at entry (in months)	0.02871	1.029	****	-0.03879	0.962	****	0.01707	1.017	****
Female	0.00719	1.007		0.01547	1.016		-0.05287	0.949	
Children of color	-0.01456	0.986		-0.45775	0.633	****	-0.066	0.936	
Hispanic ethnicity	0.37494	1.4555	***	0.03652	1.037		-0.14613	0.864	
Reason for placement - abuse	0.31278	1.367	****	-0.37945	0.684	**	-0.04058	0.96	
Reason for placement - neglect	-0.10211	0.903		-0.37807	0.685	***	0.00406	1.004	
County Child Welfare Agency characteristics									
Number of children in foster care caseload (in unit of 100)	-0.053	0.948	**	-0.01784	0.982		-0.05005	0.951	*
% social work turnover	-0.000117	1		-0.00066	0.999		-0.00083	0.999	
% use of relative placements	-0.00863	1.009		-0.01436	0.986	*	0.00434	1.004	
% use of non-family placements	-0.00123	0.999		0.00245	1.002		0.00399	1.004	
Engaged in alternative response	-0.1272	0.881		0.1757	1.192		-0.18559	0.831	
Family court available	-0.01752	0.983		0.09958	1.105		0.07195	1.075	
History of reform efforts	0.06287	1.065		0.27441	1.316	*	0.01197	1.012	
County Characteristics									
% individuals living in poverty	-0.01106	0.989		-0.03026	0.97		0.03673	1.037	***
% unemployed	0.0139	1.014		0.04407	1.045		-0.05571	0.946	
Number of violent crimes per 1,000	0.02216	1.022		-0.03325	0.967		0.02048	1.021	
Model chi-square	214.42****			237.03****			108.18****		
df	16			16			16		

* p<.05, ** p<.01, *** p<.001, **** p<.0001

Note: Standard errors estimated by a robust LWA estimator.

Table VIII

Competing risks LWA analysis for achieving permanency outcomes for children ages 2 to 12

Sample characteristics (n=11,211)	**Time to Reunification**			**Time to Adoption**			**Time to Guardianship/Custody**		
Number (%) achieving type of exit	4332 (38.64%)			1445 (12.89%)			3083 (27.50%)		
Number (%) censored	6879 (61.36%)			9766 (87.11%)			8128 (72.50%)		
	Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio	
Individual-level characteristics									
Age at entry (in years)	-0.000013	1		-0.14127	0.868	****	-0.00735	0.993	
Female	-0.04671	0.954		0.13038	1.139	**	0.04355	1.045	
Children of color	-0.03755	0.963		-0.47402	0.622	****	-0.05213	0.949	
Hispanic ethnicity	0.46681	1.595	****	0.3069	1.359	*	-0.20324	0.816	
Reason for placement - abuse	0.14838	1.16	*	-0.31462	0.73	**	-0.16216	0.85	*
Reason for placement - neglect	-0.17878	0.836	*	-0.1711	0.843		-0.11092	0.895	
County Child Welfare Agency characteristics									
Number of children in foster care caseload (in units of 100)	-0.05307	0.948	**	-0.025	0.975		-0.03267	0.968	
% social work turnover	-0.00074	0.999		-0.00014	1		-0.000697	0.999	
% use of relative placements	0.00662	1.007		-0.00239	0.998		0.01464	1.015	*
% use of non-family placements	-0.00267	0.997		0.00252	1.003		0.00534	1.005	
Engaged in alternative response	-0.06542	0.937		0.14253	1.153		-0.20781	0.812	*
Family court available	0.09909	1.104		0.13053	1.139		-0.02855	0.972	
History of reform efforts	0.03643	1.037		0.44436	1.559	**	0.09541	1.1	
County Characteristics									
% individuals living in poverty	-0.00924	0.991		-0.03852	0.962		0.03122	1.032	**
% unemployed	0.04567	1.047	*	0.08955	1.094		-0.02409	0.976	
Number of violent crimes per 1,000	0.03359	1.034		-0.03267	0.968		0.01387	1.014	
Likelihood ratio chi-square	277.39****			505.44****			238.51****		
df	16			16			16		

* p<.05, ** p<.01, *** p<.001, **** p<.0001

Note: Standard errors estimated by a robust LWA estimator.

Table IX

Competing risks LWA analysis for achieving permanency outcomes for children ages 13 and older

Sample characteristics (n=5054)	**Time to Reunification**			**Time to Adoption**			**Time to Guardianship/Custody**			**Time to emancipation**		
Number (%) achieving type of exit	2112 (41.79%)			115 (2.28%)			1061 (20.99%)			659 (13.04%)		
Number (%) censored	2942 (58.21%)			4939 (97.72%)			3993 (79.01%)			4395 (86.96%)		
	Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio		Parameter estimate	Hazard Ratio	
Individual-level characteristics												
Age at entry (in years)	0.06725	1.07	**	-0.2199	0.803	**	-0.02007	0.98		1.51307	4.541	****
Female	-0.04942	0.952		0.27486	1.316		-0.00842	0.992		0.06914	1.072	
Children of color	-0.13988	0.869	*	-0.18253	0.833		-0.12501	0.882		-0.26721	0.766	**
Hispanic ethnicity	0.26772	1.307	*	-0.00204	0.998		-0.07005	0.932		-0.55929	0.572	*
Reason for placement - abuse	-0.19382	0.824	**	0.34096	1.406		0.03557	1.036		-0.19572	0.822	
Reason for placement - neglect	-0.33063	0.718	****	0.35357	1.424		0.23127	1.26	**	0.05238	1.054	
County Child Welfare Agency characteristics												
Number of children in foster care caseload (in units of 100)	-0.01594	0.984		-0.09757	0.907		0.00404	1.004		0.00814	1.008	
% social work turnover	-0.000964	0.999		-0.01234	0.988		0.000278	1		-0.00386	0.996	
% use of relative placements	0.01037	1.01	*	0.01012	1.01		0.00817	1.008		-0.00672	0.993	
% use of non-family placements	0.00128	1.001		-0.01841	0.982		-0.00739	0.993		0.00745	1.007	
Engaged in alternative response	-0.07047	0.932		0.31173	1.366		0.13526	1.145		0.11752	1.125	
Family court available	0.17858	1.1196		0.48873	1.63		0.05611	1.058		0.08319	1.087	
History of reform efforts	0.02119	1.021		0.41294	1.511		0.11772	1.125		-0.07834	0.925	
County Characteristics												
% individuals living in poverty	-0.00388	0.996		-0.03647	0.964		0.02115	1.021	*	0.02469	1.025	
% unemployed	0.08881	1.093	**	0.16299	1.177		0.07593	1.079	*	-0.10753	0.898	
Number of violent crimes per 1,000	0.01248	1.013		0.01047	1.011		-0.02361	0.977		-0.01133	0.989	
Likelihood ratio chi-square	165.72****			46.71****			49.12****			1695.56****		
df	16			16			16			16		

* p<.05, ** p<.01, *** p<.001, **** p<.0001

Note: Standard errors estimated by a robust LWA estimator.

Table X

Summary of results: Hazard ratios and significance for all covariates for all models

	Reunification					Adoption				
	All ages		Ages 0-1	Ages 2-12	Ages 13+	All ages		Ages 0-1	Ages 2-12	Ages 13+
Sample characteristics	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects
Individual-level characteristics										
Age at entry	1.027****	1.02****	1.029****	1	1.07**	0.842****	0.806****	0.962****	0.868****	0.803**
Female	0.959*	0.96*	1.007	0.954	0.952	1.076*	1.074*	1.016	1.139**	1.316
Children of color	0.937	0.937	0.986	0.963	0.869*	0.644****	0.704****	0.633****	0.622****	0.833
Hispanic ethnicity	1.512****	1.506****	1.4555***	1.595****	1.307*	1.138	1.105	1.037	1.359*	0.998
Reason for placement - abuse	1.097	1.098	1.367****	1.16*	0.824**	0.728**	0.728**	0.684**	0.73**	1.406
Reason for placement - neglect	0.811****	0.811****	0.903	0.836*	0.718****	0.731***	0.736***	0.685***	0.843	1.424
County Child Welfare Agency characteristics										
Number of children in foster care caseload (units of 100)	0.96**	0.96**	0.948**	0.948**	0.984	0.974	0.975	0.982	0.975	0.907
% social work turnover	0.999	0.999	1	0.999	0.999	0.999	0.999	0.999	1	0.988
% use of relative placements	1.008*	1.008*	1.009	1.007	1.01*	0.992	0.986*	0.986*	0.998	1.01
% use of non-family placements	0.998	0.999	0.999	0.997	1.001	1.002	1.001	1.002	1.003	0.982
Engaged in alternative response	0.923	0.922	0.881	0.937	0.932	1.199	1.206	1.192	1.153	1.366

* p<.05, ** p<.01, *** p<.001, **** p<.0001

	Reunification					Adoption				
	All ages		Ages 0-1	Ages 2-12	Ages 13+	All ages		Ages 0-1	Ages 2-12	Ages 13+
Sample characteristics	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects
Family court available	1.103	0.942	0.983	1.104	1.1196	1.141	1.284	1.105	1.139	1.63
History of reform efforts	1.03	1.033	1.065	1.037	1.021	1.441**	1.411**	1.316*	1.559**	1.511
County Characteristics										
% individuals living in poverty	0.992	0.992	0.989	0.991	0.996	0.967*	0.966*	0.97	0.962	0.964
% unemployed	1.052*	1.052*	1.014	1.047*	1.093**	1.069	1.067	1.045	1.094	1.177
Number of violent crimes per 1,000	1.023	1.023	1.022	1.034	1.013	0.972	0.975	0.967	0.968	1.011
Cross-level interactions										
Child age at entry x Family court available	-	1.022***	-	-	-	-	-	-	-	-
Child age at entry x Use of relative placement	-	-	-	-	-	-	1.002**	-	-	-
Child of color x Family court available	-	-	-	-	-	-	0.776*	-	-	-

* p<.05, ** p<.01, *** p<.001, **** p<.0001

	Guardianship/custody					Emancipation
	All ages		Ages 0-1	Ages 2-12	Ages 13+	Ages 13+
Sample characteristics	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects	Main effects
Individual-level characteristics:						
Age at entry	1.004	1.006	1.017****	0.993	0.98	4.541****
Female	1.008	1.01	0.949	1.045	0.992	1.072
Children of color	0.927	0.925	0.936	0.949	0.882	0.766**
Hispanic ethnicity	0.855	0.853	0.864	0.816	0.932	0.572*
Reason for placement - abuse	0.932	0.933	0.96	0.85*	1.036	0.822
Reason for placement - neglect	1.092	1.091	1.004	0.895	1.26**	1.054
County Child Welfare Agency characteristics:						
Number of children in foster care caseload (in units of 100)	0.972	0.958*	0.951*	0.968	1.004	1.008
% social work turnover	0.999	0.999	0.999	0.999	1	0.996
% use of relative placements	1.011	1.011	1.004	1.015*	1.008	0.993
% use of non-family placements	1.002	1.009	1.004	1.005	0.993	1.007
Engaged in alternative response	0.875	0.789*	0.831	0.812*	1.145	1.125
Family court available	1.013	1.008	1.075	0.972	1.058	1.087
History of reform efforts	1.067	1.073	1.012	1.1	1.125	0.925
County Characteristics:						
% individuals living in poverty	1.031***	1.032***	1.037***	1.032**	1.021*	1.025
% unemployed	0.989	0.987	0.946	0.976	1.079*	0.898
Number of violent crimes per 1,000	1.008	1.008	1.021	1.014	0.977	0.989
Cross-level interactions:						
Child age at entry x Agency caseload size	-	1.002***	-	-	-	-
Child age at entry x Agency use of non-family placement	-	0.999**	-	-	-	-
Child age at entry x Agency engaged in alternative response	-	1.016*	-	-	-	-

* p<.05, ** p<.01, *** p<.001, **** p<.0001

Table XI

Summary of results: Direction and significance levels for significant results

	Reunification					Adoption				
	All ages		Ages 0-1	Ages 2-12	Ages 13+	All ages		Ages 0-1	Ages 2-12	Ages 13+
Sample characteristics	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects
Individual-level characteristics										
Age at entry	+ ****	+ ****	+ ****		+ **	- ****	- ****	- ****	- ****	- **
Female	- *	- *				+ *	+ *		+ **	
Children of color					- *	- ****	- ****	- ****	- ****	
Hispanic ethnicity	+ ****	+ ****	+ ***	+ ****	+ *				+ *	
Reason for placement - abuse			+ ****	+ *	- **	- **	- **	- **	- **	
Reason for placement - neglect	- ****	- ****		- *	- ****	- ***	- ***	- ***		
County Child Welfare Agency characteristics										
Number of children in foster care caseload (in units of 100)	- **	- **	- **	- **						
% social work turnover										
% use of relative placements	+ *	+ *			+ *		- *	- *		
% use of non-family placements										
Engaged in alternative response										
Family court available										
History of reform efforts						+ **	+ **	+ *	+ **	

	Reunification					Adoption				
	All ages		Ages 0-1	Ages 2-12	Ages 13+	All ages		Ages 0-1	Ages 2-12	Ages 13+
Sample characteristics	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects
County Characteristics										
% individuals living in poverty						- *	- *			
% unemployed	+ *	+ *		+ *	+ **					
Number of violent crimes per 1,000										
Cross-level interactions										
Child age at entry x Family court available		+ ***								
Child age at entry x Use of relative placement							+ **			
Child of color x Family court available							- *			

* p<.05, ** p<.01, *** p<.001, **** p<.0001; + increased speed of achieving permanency, - decreased speed of achieving permanency

	Guardianship/custody					Emancipation
	All ages		Ages 0-1	Ages 2-12	Ages 13+	Ages 13+
Sample characteristics	Main effects	Main effects & crosslevel interaction	Main effects	Main effects	Main effects	Main effects
Individual-level characteristics						
Age at entry			+ ****			+ ****
Female						
Children of color						- **
Hispanic ethnicity						- *
Reason for placement - abuse				- *		
Reason for placement - neglect					+ **	
County Child Welfare Agency characteristics						
Number of children in foster care caseload (in units of 100)		- *	- *			
% social work turnover						
% use of relative placements				+ *		
% use of non-family placements						
Engaged in alternative response		- *		- *		
Family court available						
History of reform efforts						
County Characteristics						
% individuals living in poverty	+ ***	+ ***	+ ***	+ **	+ *	
% unemployed					+ *	
Number of violent crimes per 1,000						
Cross-level interactions						
Child age at entry x Agency caseload size		+ ***				
Child age at entry x Agency use of non-family placement		- **				
Child age at entry x Agency engaged in alternative response		+ *				

* p<.05, ** p<.01, *** p<.001, **** p<.0001; + increased speed of achieving permanency, - decreased speed of achieving permanency

References

Adoption and Safe Families Act of 1997, Public Law 105-89.

Allison, P. D. (1995). *Survival analysis using SAS: A practical guide*. Cary, NC: SAS Institute, Inc.

Barth, R. P. (1997). Permanent placements for young children placed in foster care: A proposal for a child welfare services performance standard. *Children and Youth Services Review, 19*, 615-631.

Behn, R. D. (2002). The psychological barriers to performance management: Or why isn't everyone jumping on the performance-management bandwagon? *Public Performance & Management Review, 26*, 5-25.

Behn, R. D. (2003). Why measure performance? Different purposes require different measures. *Public Administration Review, 63*, 586-606.

Belsky, J. (1980). Child maltreatment: An ecological integration. *American Psychologist, 35*, 320-335.

Ben-Arieh, A. (2002). Evaluating the outcomes of programs versus monitoring well-being: A child-centered perspective. In T. Vecchiato, A. N. Maluccio & C. Canali (Eds.), *Evaluation in child and family services: Comparative client and program perspective* (pp. 150-160). New York: Aldine de Gruyter.

Ben-Arieh, A., & Goerge, R. M. (2006). Measuring and monitoring children's well-being: The policy process. In A. Ben-Arieh, & R. M. Goerge (Eds.), *Indicators of children's well-being: Understanding their role, usage and policy influence* (pp. 21-30). Dordrecht, The Netherlands: Springer.

Benbenishty, R., & Oyserman, D. (1996). How can integrated information systems be a support? In P. J. Pecora, W. R. Seelig, F. A. Zirps & S. M. Davis (Eds.), *Quality improvement and evaluation in child and family services: Managing into the next century* (pp. 237-263). Washington, DC: CWLA Press.

Brown, E. L. (2005). *The role of individual and community characteristics in child welfare placement decisions.* Unpublished Doctoral Dissertation, University of North Carolina at Chapel Hill School of Social Work, Chapel Hill, NC.

Cicchetti, D., & Lynch, M. (1993). Toward an ecological/transactional model of community violence and child maltreatment: Consequences for children's development. *Psychiatry, 56*, 96-118.

Coakley, J. F., & Berrick, J. D. (2007). In a rush to permanency: Preventing adoption disruption. *Child and Family Social Work, 13*, 101-112.

Coulton, C. J., Korbin, J. E., & Su, M. (1999). Neighborhoods and child maltreatment: A multi-level study. *Child Abuse & Neglect, 23*(11), 1019-1040.

Coulton, C. J., Crampton, D. S., Irwin, M., Spilsbury, J. C., & Korbin, J. E. (2007). How neighborhoods influence child maltreatment: A review of the literature and alternative pathways. *Child Abuse & Neglect, 31*, 1117-1142.

Courtney, M., Needell, B., & Wulczyn, F. (2003). National standards in the child and family services reviews: Time to improve on a good idea. *Joint Center for Poverty Research Conference on Child Welfare Services Research and its Policy Implications,* Washington, DC.

Courtney, M. E., & Wong, Y. I. (1996). Comparing the timing of exits from substitute care. *Children and Youth Services Review, 18*, 307-334.

Courty, P., & Marschke, G. (2003). Dynamics of performance measurement systems. *Oxford Review of Economic Policy, 19*, 268-284.

DePanfilis, D., & Zlotnik, J. L. (2008). Retention of front-line staff in child welfare: A systematic review of research. *Children and Youth Services Review, 30*, 995-1008.

Drake, B., Jonson-Reid, M., & Sapokaite, L. (2006). Rereporting of child maltreatment: Does participation in other public sector services moderate the likelihood of a second maltreatment report? *Child Abuse & Neglect, 30*, 1201-1226.

Duncan, D. F., Kum, H. C., Flair, K. A., Stewart, C. J. & Weigensberg, E. C. (2008). *North Carolina child welfare program.* Retrieved from http://ssw.unc.edu.libproxy.lib.unc.edu/cw/

Freisthier, B., Merritt, D. H., & LaScala, E. A. (2006). Understanding the ecology of child maltreatment: A review of the literature and directions for future research. *Child Maltreatment, 11*, 263-280.

Garbarino, J. (1977). The human ecology of child maltreatment: A conceptual model for research. *Journal of Marriage and the Family, 39*, 721-735.

Guo, S., & Wells, K. (2003). Research on timing of foster care outcomes: One methodological problem and approaches to its solution. *Social Services Review, 77*, 1-24.

Hatry, H. P. (2006). *Performance measurement: Getting results*. Washington, DC: The Urban Institute Press.

Heinrich, C. J. (2002). Outcomes-based performance management in the public sector: Implications for government accountability and effectiveness. *Public Administration Review, 62,* 712-725.

Heinrich, C. J. (2004). Improving public sector performance management: One step forward, two steps back? *Public Finance and Management, 4,* 317-351.

Hosmer, D. W., Lemeshow, S., & May, S. (2008). *Applied survival analysis: Regression modeling of time-to-event data*. Hoboken, NJ: John Wiley & Sons, Inc.

Kamensky, J. M., Morales, A., & Abramson, M. A. (2005). From "useful measures" to "measured used". In J. M. Kamensky, & A. Morales (Eds.), *Managing for results 2005* (pp. 2-14). Lanham: Rowman & Littlefield.

Krishnan, V., & Morrison, K. (1995). An ecological model of child maltreatment in a Canadian province. *Child Abuse & Neglect, 19,* 101-113.

Lee, E. W., Wei, L. J., & Amato, D. A. (1992). Cox-type regression analysis for large numbers of small groups of correlated failure time observations. In J. P. Klein, & P. K. Goel (Eds.), *Survival analysis: State of the art* (pp. 237-247). Dordrecht: Kluwer Academic Publishers.

Lerner, R. M. (2005). Urie Bronfenbrenner: Career contributions of the consummate developmental scientist. In U. Bronfenbrenner (Ed.), *Making human beings human: Bioecological perspectives on human development* (pp. ix-xxix). Thousand Oaks, CA: Sage.

Lin, D. Y. (1994). Cox regression analysis of multivariate failure time data: The marginal approach. *Statistics in Medicine, 13,* 2233-2247.

Magura, S., & Moses, B. S. (1980). Outcome measurement in child welfare. *Child Welfare, 59,* 595-606.

Mausolff, C. (2004). Learning from feedback in performance measurement systems. *Public Performance & Management Review, 28,* 9-29.

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.

McMillen, C. J., Lee, B. R., & Jonson-Reid, M. (2008). Outcomes for youth residential treatment programs using administrative data from the child welfare system: A risk-adjusted application. *Administration and Policy in Mental Health, 35,* 189-197.

Metzenbaum, S. H. (2005). Strategies for using state information: Measuring and improving program performance. In J. M. Kamensky, & A. Morales (Eds.), *Managing for results 2005*. Lanham, Rowman & Littlefield.

Needell, B., et al. (2008). *Child welfare services reports for California.* Retrieved July 17, 2008, from http://cssr.berkeley.edu/ucb_childwelfare

North Carolina Administrative Office of the Courts. (2008). *Family court.* Retrieved November 4, 2008, from http://www.nccourts.org/Citizens/CPrograms/Family/Default.asp

North Carolina Department of Health and Human Services, North Carolina Division of Social Services. (2008). *Multiple response system.* Retrieved November 1, 2008, from http://www.dhhs.state.nc.us/dss/mrs/

North Carolina Department of Justice. (2009). *North Carolina uniform crime reporting program.* Retrieved January 2, 2009, from http://sbi2.jus.state.nc.us/crp/public/Default.htm

Orlebeke, B., Wulczyn, F., & Mitchell-Herzfeld, S. (2005). Improving public child welfare agency performance in the context of the federal child and family services reviews. *The National Association for Welfare Research and Statistics,* Oklahoma City, OK.

Orthner, D., & Bowen, G. L. (2004). Strengthening practice through results management. In A. R. Roberts, & K. Corcoral (Eds.), *Handbook of practice-focused research and evaluation* (pp. 897-904). New York: Oxford University Press.

Radin, B. A. (2006). *Challenging the performance movement: Accountability, complexity, and democratic values*. Washington, DC: Georgetown University Press.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Rosenthal, J.A. (1996). Qualitative descriptors of strength of association and effect size. *Journal of Social Service Research, 21(4),* 37-59.

Scannapieco, M., & Connell-Carrick, K. (2005). *Understanding child maltreatment: An ecological and developmental perspective*. Oxford: Oxford University Press.

Shaw, T. V. (2006). Reentry into the foster care system after reunification. *Children and Youth Services Review, 28,* 1375-1390.

Spitzer, D. R. (2007). *Transforming performance measurement: Rethinking the way we measure and drive organizational success*. New York: AMACOM.

Testa, M. F., & Slack, K. S. (2002). The gift of kinship foster care. *Children and Youth Services Review, 24,* 79-108.

Title IV-E Foster Care Eligibility Reviews and Child and Family Services State Plan Reviews Rule, 45 C.F.R. 1355-1357 (2000).

Traglia, J. J., Massinga, R., Pecora, P. J., & Paddock, G. B. (1996). Implementing an outcome-oriented approach to case planning and service improvement. In P. J. Pecora, W. R. Seelig, F. A. Zirps & S. M. Davis (Eds.), *Quality improvement and evaluation in child and family services: Managing into the next century* (pp. 77-98). Washington, DC: CWLA Press.

U.S. Census Bureau. (2007). *Census 2000 urban and rural classification.* Retrieved October 18, 2008, from http://www.census.gov/geo/www/ua/ua_2k.html

U.S. Census Bureau. (2008). *Small area income and poverty estimates.* Retrieved November 5, 2008, from http://www.census.gov/hhes/www/saipe/

U.S. Department of Labor, Bureau of Labor Statistics. (2005). *Local area unemployment statistics.* Retrieved October 31, 2008, from http://www.bls.gov.libproxy.lib.unc.edu/lau/laumthd.htm

U.S. Government Accountability Office. (2003). *HHS could play a greater role in helping child welfare agencies recruit and retain staff*. Washington, DC: U.S. Government Accountability Office.

U.S. Government Accountability Office. (2004). *Child and family services reviews: Better use of data and improved guidance could enhance HHS's oversight of state performance*. Washington, DC: U.S. Government Accountability Office.

Usher, C. L., Locklin, E., Wildfire, J. B., & Harris, C. C. (2001). Child welfare performance ratings: One state's approach. *Administration in Social Work, 25*, 35-51.

Usher, C. L., Randolph, K. A., & Gogan, H. C. (1999). Placement patterns in foster care. *Social Service Review, 73*, 22-36.

Usher, C. L., Wildfire, J. B., & Gibbs, D. A. (1999). Measuring performance in child welfare: Secondary effects of success. *Child Welfare, 78*, 31-51.

Webster, D., Usher, C. L., Needell, B., & Wildfire, J. (2008). Self-evaluation: Using data to guide policy and practice in public child welfare agencies. In D. Lindsey, & A. Shlonsky (Eds.), *Child welfare research: Advances for practice and policy* (pp. 261-270). Oxford: Oxford University Press.

Wei, L. J., Lin, D. Y., & Weissfeld, L. (1989). Regression analysis of multivariate incomplete failure time data by modeling marginal distributions. *Journal of the American Statistical Association, 84*(408), 1065-1073.

Weissman, A. M., Jogerst, G. J., & Dawson, J. D. (2003). Community characteristics associated with child abuse in Iowa. *Child Abuse & Neglect, 27*, 1145-1159.

Wells, K., & Guo, S. (1999). Reunification and reentry of foster children. *Children and Youth Services Review, 21*, 273-294.

Wells, K., & Guo, S. (2004). Reunification of foster children before and after welfare reform. *Social Service Review, 78*, 74-95.

Wells, R. (2006). Managing child welfare agencies: What do we know about what works? *Children and Youth Services Review, 28*, 1181-1194.

Wells, S. J., Lyons, P., Doueck, H. J., Brown, C. H., & Thomas, J. (2004). Ecological factors and screening in child protective services. *Children and Youth Services Review, 26*, 981-997.

Wholey, J. S., & Hatry, H. P. (1992). The case for performance monitoring. *Public Administration Review, 52*, 604-610.

Wildfire, J., Barth, R. P., & Green, R. L. (2007). Predictors of reunification. In R. Haskins, F. Wulczyn & M. B. Webb (Eds.), *Child protection: Using research to improve policy and practice* (pp. 170). Washington, DC: Brooking Institution Press.

Wulczyn, F. (1991). Caseload dynamics and foster care reentry. *Social Service Review, 65*, 133-156.

Wulczyn, F. (1996). A statistical and methodological framework for analyzing the foster care experiences of children. *Social Service Review, 70*, 318-329.

Wulczyn, F. (2007). *Monitoring child welfare programs: Performance improvement in a CQI context*. Chicago, IL: Chapin Hall.

Wulczyn, F., Barth, R. P., Yuan, Y. T., Harden, B. J., & Landsverk, J. (2005). *Beyond common sense: Child welfare, child well-being, and the evidence for policy reform*. New Brunswick: Aldine Transaction.

Wulczyn, F., Chen, L., & Hislop, K. B. (2007). *Foster care dynamics 2000-2005: A report from the multistate foster care data archive*. Chicago, IL: Chapin Hall Center for Children at the University of Chicago.

Wulczyn, F., & Hislop, K. B. (2003). *Foster care dynamics in urban and non-urban counties*. Chicago: Chapin Hall Center for Children at the University of Chicago.

Wulczyn, F., Kogan, J., & Dilts, J. (2001). The effect of population dynamics on performance measurement. *Social Service Review, 75*, 292-317.

Wulczyn, F., Barth, R. P., Yuan, Y. T., Harden, B. J., & Landsverk, J. (2005). *Beyond common sense: Child welfare, child well-being, and the evidence for policy reform*. New Brunswick: Aldine Transaction.

Wulczyn, F., & Lery, B. (2007). *Racial disparity in foster care admissions*. Chicago: Chapin Hall Center for Children at the University of Chicago.

Yoo, J., Brooks, D., & Patti, R. (2007). Organizational constructs as predictors of effectiveness in child welfare interventions. *Child Welfare, 86,* 53-86.