Adolescent Motherhood and the Child Welfare System:
Incidence and Prevalence of Early Childbearing among Maltreated Girls Exposed to Foster Care

By

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A dissertation submitted in partial satisfaction of the requirements for the degree of

Doctor of Philosophy

in

Social Welfare in the

Graduate Division

of the

University of California, Berkeley

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Fall 2014

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Abstract

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Although research has suggested that girls in foster care are at high risk of early childbirth, limited data have been available from which rates could be calculated and characterized. Using probabilistically linked vital birth records and administrative child welfare service data for the state of California, this study involved two separate analyses that measured the incidence and prevalence of early childbearing among maltreated adolescent girls who received child welfare services or were in foster care.

The study generated cross-sectional birth rates among adolescent girls in foster care and compared those rates to similarly aged girls in the general population. Results indicated that a relatively small number of 15- to 17-year-old girls in foster care gave birth each year but on average, birth rates were 60% higher among the foster care population than they were in the general population. Black and Latina adolescents in foster care were more likely to give birth than their White counterparts. Girls who were in foster care for less time or experienced greater placement instability also had higher rates of adolescent childbirth.

The study also prospectively assessed the cumulative rate of a first birth among a cohort of girls who experienced their first known substantiated allegation of maltreatment after their 10th birthday. Extended Cox proportional hazards models were specified to assess whether or not placement in foster care was associated with a higher rate of early childbirth. Among the full population, just under 18% gave birth for the first time before their 20th birthday. After adjusting for race/ethnicity and maltreatment-related experiences, adolescent girls who spent time in foster care gave birth at a rate that was 12% higher than those who remained at home.

Adolescent mothers with a history of maltreatment and foster care placement may be particularly vulnerable to social, economic and emotional challenges across a number of domains, including a heightened risk for maltreating their own children. The child welfare system has a unique opportunity to provide targeted services and supports to adolescent girls in foster care before, during, and after pregnancy, which can promote their well-being and prevent intergenerational abuse and neglect.

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ACKNOWLEDGEMENTS

I first want to acknowledge and thank the Center for Children and Youth Policy and the Berkeley Empirical Legal Studies Graduate Fellowship for their generous funding and support of my dissertation. I also want to acknowledge the Conrad N. Hilton Foundation for funding the larger study that made my dissertation possible.

I am incredibly grateful to my committee for their mentorship, insight, and encouragement, particularly in the last frantic sprint to the finish line. Their combined scholarly brilliance has made this a more rigorous, integrated, and thoughtful study. In particular, I want to thank Jill Duerr Berrick for her endless optimism and intellectual depth, and for all of the discussions about the child welfare system that shaped my thinking on this dissertation. She has never failed to provide me with inspiration and renewed confidence. I also want to acknowledge Emily Putnam-Hornstein, who has been my mentor, colleague, and friend since my second year of the doctoral program. In addition to being a superb scholar, she has been incredibly generous with both her time and resources and has provided me with numerous research and teaching opportunities that have, quite literally, shaped my early career. I cannot thank her enough.

I want to acknowledge the California Child Welfare Indicators Project (CCWIP), where I have been a Graduate Student Researcher since 2010 and without which this dissertation would not have been possible. The work that Barbara Needell has done to build and nurture CCWIP's partnership with the California Department of Social Services and to make child welfare data both public and accessible is extraordinary. I am grateful for her support of my research, for her razor sharp insight, and for her statewide and national leadership on the use of administrative data.

I am indebted to the faculty, staff, and students of the School of Social Welfare. In particular, I would like to thank Eileen Gambrill and Neil Gilbert for informing my early ideas about assessing the long-term impacts of foster care. I am especially thankful for the camaraderie and support of my doctoral colleagues.

I would not have been able to complete this journey without the unfailing support of my family, including my mother and my sister-in-law. My partner (and wife) has been my greatest champion and has weathered the storm of the doctoral program with grace and compassion. Particularly in the last few months, she went above and beyond to ensure that I made it to the finish line and for that, I am incredibly grateful.

CHAPTER 1: BACKGROUND AND SIGNIFICANCE

The national birth rate for mothers aged 15-19 fell to a historic low of about 29 births per 1,000 teenagers in 2012, which represents a 52% decline in the teenage birth rate since 1991 (Martin, Hamilton, Osterman, Curtin, & Mathews, 2013). In spite of this decrease, the United States still has one of the highest adolescent birth rates among industrialized countries (B. Hamilton & Ventura, 2012) and adolescent parenting continues to be viewed as a significant public health concern (Klein, 2005). Adolescent parenting is associated with diminished physical health (Patel & Sen, 2012), higher incidence of depression (Barnet, Liu, & Devoe, 2008), and limited educational and vocational success (Boden, Fergusson, & Horwood, 2008). Health, social, and educational challenges are also well documented among children born to adolescent mothers (Chen et al., 2007; Jaffee, Caspi, Moffitt, Belsky, & Silva, 2001; Jutte et al., 2010), including an increased risk for experiencing maltreatment (Lee & George, 1999; Putnam-Hornstein & Needell, 2011).

The fact that adolescent birth rates have steadily declined since the early 1990s indicates that at the broadest levels, various prevention efforts may have contributed to reducing unintended pregnancies among adolescents in the general population (B. Hamilton & Ventura, 2012). As such, the target of teenage pregnancy prevention is now shifting towards groups at particularly high-risk, including adolescents who have been maltreated and have spent time in foster care (Boonstra, 2011; Love, McIntosh, Rosst, & Tertzakian, 2005). This targeting appears to be warranted since a recent study found that among adolescent mothers who gave birth in California, 45% had been reported for maltreatment, 17.5% had been substantiated as victims of abuse or neglect and 8% had spent time in foster care (Putnam-Hornstein, Cederbaum, King, Cleveland, & Needell, 2013). Further, rates of pregnancy and childbearing among adolescents in or recently exiting from foster care is reported to be substantially high (Courtney et al., 2005; Gotbaum, 2005), and often far higher than adolescents in the general population (Dworsky & Courtney, 2010; Shaw, Barth, Svoboda, & Shaikh, 2010; Vinnerljung, Franzén, & Danielsson, 2007).

The small body of research regarding childbirth among adolescent girls in foster care, while critical to highlighting the unique vulnerability of this population, is limited in its capacity to shed light on the relationship between early childbearing and a history of being in foster care. One limitation is that the base population used for most of these studies may not be representative of all adolescent girls in foster care and may be biased towards particular subgroups with a higher likelihood of early parenting. Relatedly, the methods for identifying those who give birth within these groups have their own limitations and rely, almost exclusively, on self-reported survey data. This has led to a relatively restricted universe of adolescent girls in foster care who may or may not have given birth. Of the relatively few studies that attempt to distinguish early parenting rates of girls in foster care from those in the general population, a number of them cannot account for the contribution of socioeconomic, maltreatment, and family-related risk factors that are associated with higher rates of teen childbirth even though those conditions are disproportionately experienced by adolescents in foster care. Further, few studies have assessed differences in early childbearing between maltreated adolescents who spend time in foster care compared to those that remain at home with their families.

This dissertation will address these limitations by being the first study in the United States to link vital birth records and child welfare service records to measure the incidence and prevalence of adolescent childbearing among girls exposed to foster care. These population-based data will be used to: 1) generate annual birth rates among adolescent girls in foster care during the same year they gave birth; and 2) assess the incidence of early childbirth among a cohort of maltreated adolescent girls and determine the difference in birth rates between those who enter foster care compared to those who remain at home.

The following sections will review the relevant literature regarding early childbirth among adolescent girls in foster care. First, the next section will describe what is known about the circumstances of young women who have been in foster care and gave birth as adolescents, although this research is fairly limited. Second, factors associated with early pregnancy and childbearing that have particular relevance to adolescents in foster care will be discussed. These factors include: race/ethnicity and socioeconomic status; a history of maltreatment; high-risk sexual behavior such as early sexual debut, unprotected sex, and multiple sexual partners; problems with access to reproductive health care; and the desire to have children to create stability and permanence. Third, the studies that have been conducted on childbirth to adolescents in or recently exiting from foster care will be reviewed. This will be followed by a discussion of the limitations of this research. Finally, after establishing the need for basic epidemiological data on this population, the two analyses that constitute the current study will be described.

Circumstances of Young Mothers who have been in Foster Care

Relatively little is known about the circumstances of current and former foster youth who give birth as adolescents and young adults, although challenges with respect to social and economic functioning have been well-documented among adolescent mothers in the general population. The few studies that have been conducted indicate that young mothers with a foster care history are struggling in a number of areas, but whether or not their difficulties are a dramatic departure from other young mothers with similar baseline characteristics is unknown. For example, Courtney and colleagues (2012) examined the characteristics of former foster youth as young adults by creating subgroups based on traditional markers used to characterize the transition to adulthood, including education, employment, and social support. One such group, which they called “Struggling Parents,” constituted about one quarter of the study population. Youth in this group were primarily mothers who were less likely to have completed high school, be enrolled in college, be employed, and have sufficient social supports than other former foster youth. Similarly, another study conducted in the United Kingdom on the experiences and perceptions of parenting youth in and leaving foster care found that economic hardship, unstable or inappropriate housing, inconsistent emotional support, and struggles with postpartum depression were common (Chase, Maxwell, Knight, & Aggleton, 2006).

The one study that compared the circumstances of parenting former foster youth to youth in the general population found that repeat pregnancies and childbirth during adolescence appear to be more common among the foster care population (Dworsky & Courtney, 2010). Another study conducted only among pregnant and parenting foster youth indicated that among females, about 30% of those who had been pregnant experienced a second pregnancy during adolescence and of those who were mothers, about a quarter of them had more than one child (Dworsky &

DeCoursey, 2009). Similarly, among girls in foster care at age 17 who gave birth before age 18, over 40% gave birth again before age 20 (Putnam-Hornstein & King, 2014). There is also some evidence to indicate that children born to mothers in foster care may be at risk for child welfare involvement. Dworsky and DeCoursey's (2009) examination of pregnant and parenting foster youth found that 22% of mothers were investigated for an allegation of maltreatment and 11% had their children placed into foster care.

Many current and former foster youth report that becoming a parent was a positive and stabilizing experience (Chase et al., 2006; Knight, Chase, & Aggleton, 2006; Love et al., 2005). However, the limited research on the circumstances of young mothers who are or have been in foster care suggests that the decision to parent may put both themselves and their children in a position of social, economic, and emotional vulnerability. The child welfare system has the opportunity to provide supports to mothers in foster care and preventive services to adolescents in care who may be at risk for giving birth. Without epidemiological data on the prevalence and incidence of early childbirth among the population of adolescent girls in foster care, the targeting and delivery of such services and supports is challenging.

Factors Associated with Early Childbearing among Girls in Foster Care

The body of literature regarding adolescent pregnancy and childbirth indicates that these phenomenon are multi-determined, with associated risk factors ranging from genetic and biological characteristics to community-level conditions (Kirby, 2002; Miller, Benson, & Galbraith, 2001; Woodward, Fergusson, & Horwood, 2001). For example, early pregnancy is more common among adolescent girls who experience early menarche (Dunbar, Sheeder, Lezotte, Dabelea, & Stevens-Simon, 2008). A number of parental behaviors have been found to reduce the likelihood of adolescent pregnancy and parenting, including parent/child connectedness, parental monitoring and supervision, and parental values discouraging adolescent intercourse (particularly unprotected intercourse) and pregnancy (East, Khoo, & Reyes, 2006; Guilamo-Ramos et al., 2012; Miller et al., 2001). Academic and school difficulties and engagement in other high-risk behaviors such as associating with delinquent peers and substance use have also been correlated with early pregnancy and childbirth (Kirby, 2002).

Research has indicated that early pregnancy and childbearing is associated with a number of demographic and social characteristics (Klein, 2005; Woodward et al., 2001). Disparities in early parenting are evident across race/ethnicity (Carter McLaughlin & Luker, 2006; Finer & Zolna, 2011). In 2011, teenage mothers were more than twice as likely to be Black or Latina than their White counterparts (2.7 and 2.4 respectively), although Black and Latina birth rates have declined more over the last twenty years than White birth rates (B. Hamilton, Martin, & Ventura, 2012). These disparities are often coupled with socioeconomic disadvantage, thereby increasing the likelihood that poor Black and Latina girls will become parents as adolescents (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010). In general, unfavorable socioeconomic conditions experienced at the community and family levels contribute to the high teen birth rate in the U.S. (Kearney & Levine, 2007; Penman-Aguilar, Carter, Snead, & Kourtis, 2013), with adolescent mothers more likely to come from low-income families (Kearney & Levine, 2007; Young, Turner, Denny, & Young, 2004) and neighborhoods/counties (Harding, 2003; Kirby, Coyle, & Gould, 2001).

It is important to note that adolescents in foster care are more likely to be from these same racial/ethnic and socioeconomic backgrounds. In fact, income and racial/ethnic disparities in child welfare involvement have been well documented and could be contributing to higher rates of childbirth among all adolescent girls who been involved with the child welfare system, especially those who send time in foster care. In addition to the higher concentration of social and economic risk factors, there are additional experiences that may be unique to adolescents in foster care compared to youth in the general population. Other factors associated with adolescent childbearing, which may be particularly relevant to girls in foster care, include the impact of being abused or neglected; greater involvement in high-risk sexual behavior (e.g. early sexual initiation, unprotected sex, and multiple partners); problems with access and effective use of reproductive health services and supports; and the decision to become a parent based on the desire for attachment and stability.

Socioeconomic Status, Race/Ethnicity, and the Child Welfare System

In terms of socioeconomic status, poor children are represented at disparate rates on child welfare caseloads (Jonson-Reid, Drake, & Kohl, 2009). This representation may be partially explained by national incidence studies which indicate that children in low income households had far higher rates of maltreatment than other children (Sedlak et al., 2010) and that poor children reported for maltreatment are at greater risk for adverse outcomes across other systems of care (Jonson-Reid et al., 2009). Additionally, community-level indicators of poverty and socioeconomic disadvantage (e.g. residential instability, household and age structure, and geographic proximity of neighborhoods to concentrated poverty) have been associated with higher rates of maltreatment (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007; Coulton, Korbin, Su, & Chow, 1995).

On an aggregate level, the disproportionate and disparate involvement of Black children in the child welfare system has been well documented (Derezotes, Poertner, & Testa, 2005; Magruder & Shaw, 2008; Needell et al., 2014). For example, of children in California in 2013, Black children were more than four times as likely to be in foster care as White children (Needell et al., 2014). There are debates on the drivers of these disparities, with some scholars arguing that the overrepresentation of Black children is due to systematic discrimination and the punishment of Black parents for being poor (Derezotes et al., 2005; Roberts, 2002). Research has demonstrated that socioeconomic status plays a role in such disparities and that controlling for poverty and other social and health risks minimizes or reverses disparities in maltreatment reporting, substantiation, and entry into care, both at the individual (Ards, Myers, Chung, Malkis, & Hagerty, 2003; Dworsky, Courtney, & Zinn, 2007; Putnam-Hornstein, Needell, King, & Johnson-Motoyama, 2013; Slack et al., 2007) and at the neighborhood level (Drake, Lee, & Jonson-Reid, 2009; Wulczyn, Gibbons, Snowden, & Lery, 2013).

The involvement of Latino children and families in the child welfare system is not necessarily characterized by such persistent disparities. Nationally, Latino children are slightly underrepresented in the child welfare population (Dettlaff & Johnson, 2011; Dettlaff, 2011). In California, Latino children are only slightly (12%) more likely to be in foster care than White children (Needell et al., 2014). The aggregate data mask a number of important issues with respect to child welfare involvement for this population. First, Latinos are the fastest growing racial/ethnic group in the U.S., indeed, more than half of the growth in the total population

between 2000 and 2010 was due to the increase in the Latino population (Ennis, Rios-Vargas, & Albert, 2011). In California, Latinos constitute the single largest racial/ethnic group in both the general population and the foster care population (California Department of Finance, 2013; Needell et al., 2014). Second, there is substantial regional and state variability with respect to the number of Latinos in the population and their representation in child welfare. In one California county for example, Latino children are more than three times as likely to be in foster care as White children (Needell et al., 2014). Third, there are key differences in child welfare involvement among Latinos depending on immigration status and level of acculturation (Dettlaff & Johnson, 2011; Putnam-Hornstein, Needell, et al., 2013).

In sum, the research indicates that the phenomenon of racial disparity in child welfare involvement is likely due to the complex interplay of structural factors that place Black and some Latino children at greater risk for both maltreatment and foster care placement, although the influence of bias on the part of child welfare workers cannot be dismissed entirely (Dettlaff et al., 2011),. Regardless of the reason, Black children are represented in foster care at disproportional and disparate rates compared to White children and Latinos outnumber White children in foster care in California by a ratio of 2 to 1. Given these issues and the disparate rates of pregnancy and childbearing for Black and Latina adolescents, an assessment of the relationship between teen childbearing and placement in foster care requires that the effect of race/ethnicity be a central consideration.

Maltreatment

Research has demonstrated that, in general, adverse childhood experiences contribute to higher rates of early parenting (Hillis et al., 2004), although the existence of a causal link between childhood maltreatment and teen pregnancy has been debated (Blinn-Pike, Berger, Dixon, Kuschel, & Kaplan, 2002). The association between maltreatment and either high-risk sexual behavior, teenage pregnancy, or childbirth appears to be moderated by both the type of maltreatment reported and the developmental period in which it occurred.

To date, the strongest findings regarding the relationship between maltreatment and teenage pregnancy involve children and adolescents who have experienced sexual abuse (Boyer & Fine, 1992; Noll, Shenk, & Putnam, 2009; Noll, Trickett, & Putnam, 2003; Saewyc, Magee, & Pettingell, 2004; Stock, Bell, Boyer, & Connell, 1997). One prospective study assessed a number of factors related to sexual attitudes and sexual behaviors of older adolescents and young women (Noll et al., 2003). The results indicate that participants who experienced substantiated sexual abuse between the ages of 6 and 16 reported being significantly younger at the age of voluntary intercourse, reported less birth control efficacy, were younger at the birth of their first child, and were more likely to be teen mothers than were comparison participants. Noll and colleagues (2009) conducted a meta-analysis on the relationship between sexual abuse and teen pregnancy by aggregating effect sizes across a number of studies. Their findings indicate that girls who experienced childhood sexual abuse had more than twice the odds of pregnancy as an adolescent. In addition, a supplemental analysis found that over 40% of pregnant adolescents reported a history of childhood sexual abuse. Similarly, another study found that among young women who got pregnant as adolescents, two-thirds reported that they had been sexually abused (Boyer & Fine, 1992). Further, those who had been sexually abused began intercourse a year earlier, were more likely to have used drugs and alcohol and were less likely to practice contraception

compared to young women with no such history. A final study found that among Black women giving birth for the first time, child sexual abuse was associated with younger age at first pregnancy (Fiscella, Kitzman, Cole, Sidora, & Olds, 1998).

Other types of maltreatment have also been linked to high-risk sexual behavior and teen pregnancy. One study, for example, assessed the influence of reported past abuse among adolescents receiving health services. The study found that while any past abuse was significantly higher in girls who had ever been pregnant, physical abuse in particular, was associated with pregnancy as an adolescent (Adams & East, 1999). Similarly, Herrenkohl and colleagues (1998) found that physical abuse occurring during pre-school and elementary school years, especially when combined with neglect, was associated with pregnancy during adolescence. Merrick and colleagues (2008) were explicit in their goal to test the relationship between sexualized behavior and other types of maltreatment among younger children. Their findings indicated that official reports of physical abuse occurring prior to age eight were associated with greater odds of engaging in sexualized behavior.

The timing of maltreatment also appears to have an impact on the likelihood of adolescent pregnancy and parenting. A recent longitudinal study found that maltreated adolescent girls who experienced substantiated maltreatment had twice the odds of giving birth within 12 months of a substantiated report of abuse or neglect (Noll & Shenk, 2013). In this study, adolescent girls who experienced sexual abuse or neglect had higher rates of adolescent childbirth than their non-maltreated counterparts. Young and colleagues (2011) assessed the hazard of pregnancy as an adolescent among a multi-ethnic community-based sample depending on whether sexual abuse occurred during childhood, adolescence, or both. Although the greatest hazard for adolescent pregnancy was observed among those who experienced sexual abuse during both childhood and adolescence (80% greater hazard compared to those with no history of sexual abuse), those who only experienced adolescent sexual abuse had a 30% greater hazard of adolescent pregnancy. Similarly, Thornberry and colleagues (2001) found that any maltreatment occurring in both childhood and adolescence and that neglect occurring only during adolescence were associated with teenage pregnancy. Lastly and importantly, another study assessed the causal effect of the timing of abuse and neglect among a longitudinal community-based sample of adolescents who were followed from middle school into adulthood (Thornberry, Henry, Ireland, & Smith, 2010). These adolescents were matched on a number of risk factors for child maltreatment. Findings indicate that compared to adolescents who were not maltreated, those who were maltreated during adolescence were significantly more likely to engage in risky sex or contract a sexually transmitted infection.

High Risk Sexual Behavior

Greater engagement in high-risk sexual behaviors is the most consistently implicated mechanism in the research regarding the rate of unintended pregnancy and childbearing. Among all adolescents (ages 15-19) with pregnancies in 2006, the vast majority (82%) were intended and the national unintended pregnancy rate was estimated to be about 60 per 1,000 (Finer & Zolna, 2011). Among girls in foster care, unintended pregnancy as a result of sexual risk behavior may be related to the impact of maltreatment, exposure to the foster care system, or a combination of both experiences, although existing research has not been able to disentangle these relationships. With respect to childhood abuse, a consistent association between

maltreatment and high risk sexual behavior in adolescence and early adulthood has been demonstrated across a number of studies (Arriola, Louden, Doldren, & Fortenberry, 2005; Cunningham, Stiffman, Doré, & Earls, 1994; Saewyc et al., 2004; Stock et al., 1997).

Research regarding the impact of exposure to foster care on sexual risk is mixed and appears to depend on the comparison group. Importantly, an association between exposure to foster care and high-risk sexual behavior has only been established in studies comparing adolescent girls with a history of foster care placement to those without such a history. For example, Ahrens and colleagues (2010) found that among a nationally representative sample of female adolescents, those who had been foster care had greater odds of contracting a sexually transmitted infection versus those who were never in foster care. Among adolescent girls who reported a history of vaginal intercourse, those who had been in foster care reported a younger age at first sexual intercourse and a higher number of lifetime partners compared with those in the general population. Another study found that being in foster care or kinship care was associated with younger age at first conception and a higher than average number of sexual partners (Carpenter, Clyman, Davidson, & Steiner, 2001).

On the other hand, among adolescents who have been maltreated and are under the supervision of the child welfare system, the association between foster care exposure and high risk sexual behavior disappears. One study found that although adolescents receiving child welfare services had high rates of engagement in health-risk behaviors (including sexual risk behaviors), there were no statistically significant differences between those who were in foster care compared to those who remained at home (Leslie et al., 2010). Similarly, James and colleagues (2009) found that being in out of home care was not associated with greater engagement in sexual risk behaviors. These results suggest that while adolescents in care may engage in high-risk sexual activity, the specific contribution of being in foster care to this behavior continues to be unclear.

Services and Supports to Promote Reproductive Health

Another factor that has been posited to explain the high rates of pregnancy and childbearing among adolescents in foster care is the difficulty in accessing and effectively utilizing reproductive and sexual health education, counseling, and services (Chase et al., 2006; Constantine, Jerman, & Constantine, 2009; Hudson, 2012; Love et al., 2005; Shaw et al., 2010). Love and colleagues (2005) conducted focus groups with foster youth who reported that they are receiving information about sexual and reproductive health, but that information is coming after they have already started having sex. They also reported that they have access to contraception, but are not necessarily using it carefully and consistently. Hudson's (2012) study identified three themes with respect to where and how foster youth received information about sexual and reproductive health: discomfort visiting and disclosing to health care providers; inconsistency with respect to receiving basic information regarding the prevention of pregnancy and sexually transmitted infections from health care providers; and receiving information in other community settings (e.g. school or group homes).

These themes were echoed in a report from a needs assessment conducted in three California counties on the reproductive and sexual health needs of foster youth (Constantine et al., 2009) . In addition, the report identified that social workers feel unprepared to broach these

issues with foster youth and unclear about whether this is an appropriate and sanctioned role. Another study involved conducting discussions with experts in the field of pregnancy prevention, focus groups with adolescents in foster care, and surveys from child welfare workers in Maryland (Shaw et al., 2010). The results identified issues with consistent access to prevention services and problems with respect to the ambiguous role of child welfare workers in addressing issues of sexual and reproductive health. One worker reported:

> Providing information related to teen pregnancy prevention can be a slippery slope for child welfare staff. Such information may conflict with the religious, political or philosophical beliefs of the people involved, which is why, I suspect, youth are too often left to their own devices to find information. (Shaw et al., 2010, p. 83)

Need for Attachment and Stability

A final explanation involves the decision to parent, regardless of whether or not the pregnancy was intended. Pregnancy intentions are difficult to measure and some researchers have described that many adolescents who get pregnant are actually ambivalent about becoming a parent, which contributes to problems with contraceptive use (Chase et al., 2006; Kearney & Levine, 2007). A number of qualitative studies have indicated that pregnant and parenting teens in and recently exiting from foster care are seeking to establish stability, permanence, and an opportunity to successfully provide a loving family life that was absent in their own childhood (Chase et al., 2006; Dworsky & DeCoursey, 2009; Knight et al., 2006; Love et al., 2005; Pryce & Samuels, 2010; Shaw et al., 2010). A study conducted in the United Kingdom on parenting youth in and leaving care identified abandonment, distrust, instability, and lack of attachments as the reason for continuing with an unplanned pregnancy. One young mother in the study reported that as a parent, she would be able to raise her son "the way I want him brought up instead of all these different families bringing him up like I was" (Chase et al., 2006, p. 443).

Indeed, some adolescent girls describe parenting as an opportunity to be successful where their own parents failed (Pryce & Samuels, 2010). Mothers who have been in foster care also report that having a baby helped them to curb their own destructive behavior and motivated them to become more responsible (Love et al., 2005). Overall, these studies have identified that many adolescents who have been in foster care perceive that giving birth is potentially beneficial. One study, which found that over one-third of young women who were pregnant by age 19 reported that they wanted to be pregnant (Dworsky & Courtney, 2010), may reflect this perspective.

Childbirth among Adolescent Girls in Foster Care

Research indicates that the determinants of childbearing among current and former foster youth may be complex and multi-layered, making it difficult to assess which adolescents in foster care are at greatest risk and how prevention and supportive services might be effectively targeted to either help delay pregnancy or ensure the well-being of both the mother and her child. The research regarding the relationship between placement in foster care and the risk of teenage pregnancy and childbearing indicates that in general, adolescents who have been in foster care have high rates of birth that often exceed those of adolescents in the general population (Carpenter et al., 2001; Dworsky & Courtney, 2010; Gotbaum, 2005; Pecora et al., 2003; Shaw et al., 2010; Vinnerljung et al., 2007).

Carpenter and colleagues (2001) found that women who had been in out-of-home placements, including foster care and kinship care, experienced their first pregnancy at a younger age than their counterparts who were not in out of home care. One study found that among adolescent girls in foster care in Maryland, the birth rate was 93 per 1,000, a rate three times higher than the state's overall adolescent birth rate (Shaw et al., 2010). Gotbaum's (2005) study in New York City found that among female adolescents served by foster care agencies, 1 in 6 were either pregnant or parenting. A Swedish study, which used linked birth and child welfare records, found that being in an out of home placement as an adolescent substantially increased the odds of early childbirth compared to girls in the general population (Vinnerljung et al., 2007).

The link between foster care and adolescent childbirth may be even stronger among those girls who are in foster care during later adolescence and are approaching the transition to adulthood. One recent study found that among adolescent girls in foster care at age 17 in California, almost 12% had given birth for the first time before age 18, but about 28% had given birth before age 20 (Putnam-Hornstein & King, 2014). Similarly, approximately 32% of female foster youth from a Midwest sample reported that they had given birth by age 19 (Courtney et al., 2005). Additionally, Dworsky and Courtney (2010) found that half of transition-age female foster youth from the same Midwest sample had been pregnant by age 19 compared to one-fifth of a nationally representative (U.S.), general population sample of youth.

Findings from studies that have compared the rates of early parenting among adolescent girls under the supervision of the child welfare system who either enter foster care or remain at home with their families are mixed. One study specifically sought out to determine the causal effects of foster care by using the placement tendency of child welfare workers as an instrumental variable and assessing outcomes among adolescents that had been on the margin of foster care placement, meaning that investigators may have disagreed about the recommendation of removal from their family (Doyle Jr., 2007). The results indicate that the birth rate among girls in foster care was significantly higher than for those who remained with their families. On the other hand, another less rigorous, study found that while adolescent girls receiving child welfare services had higher rates of pregnancy than girls in the general population, there was little observable difference between those in foster care and those receiving services at home (Polit, Morton, & White, 1989). Lastly, Dworsky and Courtney (2010) found that among older adolescents who were in foster care at age 17, those who remained in foster care through age 19 had a 47% reduction in the estimated hazard of becoming pregnant.

Limitations of this Research

Despite findings that suggest a heightened risk of parenting among female adolescents in foster care, particularly when compared to adolescent girls in the general population, it is challenging to draw firm conclusions concerning the epidemiology and risk of childbirth among adolescents in foster care. Studies that rely on a point-in-time (e.g., on the last day of the year) estimate of adolescent girls in care who are pregnant or parenting may not be an accurate or representative count of adolescents who experience foster care as they are biased towards those with longer stays (Courtney, Needell, & Wulczyn, 2004). Additionally, they may not adequately represent all adolescents in care who give birth since not all young mothers remain in care with their children and such estimates may miss adolescents who exit care just prior to giving birth or those that enter care just after giving birth. Surveys of a small, but meaningful, population of

adolescents who exit foster care having reached the age of majority are also potentially biased since many children, even adolescents, exit care for reasons other than emancipation.

More importantly, the majority of these studies identified adolescents who got pregnant or gave birth by relying on self-reported survey data from youth or service providers, which may have its own limitations with respect to response bias and generalizability. One study used administrative child welfare data to determine if a girl in foster care had an associated child in her record (Shaw et al., 2010). By and large, child welfare case management systems do not track whether or not girls in care get pregnant or give birth, making an accurate assessment of the prevalence of early parenting within the foster care population challenging, if not impossible. Even more challenging is the fact that administrative child welfare service data, while tremendously useful in describing children's experiences in the child welfare system (Drake & Jonson-Reid, 1999), can only provide information for the time periods in which they are receiving services or are in foster care. What transpires prior to contact with child welfare services, in between episodes of service provision, or when the case closed is unknown (Putnam-Hornstein, Webster, Needell, & Magruder, 2011).

A final and significant limitation is the comparison group for many of the studies reviewed. Given the fact that adolescents in foster care represent a population with a particularly high concentration of the same social and economic risk factors associated with adolescent childbirth, comparing girls in foster care to girls in the general population without accounting for race/ethnicity, socioeconomic status, neighborhood or community-level disadvantage could be misleading. For example, Berzin (2008) found that when comparing former foster youth to a nationally representative sample of youth who were matched on individual, familial, socioeconomic, and communal risk factors, there were no statistically significant differences in the odds of becoming a parent as an adolescent. Data on cross-sectional birth rates across socioeconomic characteristics is limited, however, one nationally representative study found that before age 20, the probability of a first birth for girls whose mothers didn't graduate from high school was 28% (vs. 14% for those whose mothers graduated from high school or received a GED; Martinez, Copen, & Abma, 2011). This rate is comparable to cited studies that found similar cumulative rates of teen parenting among girls in foster care at age 17 (Dworsky & Courtney, 2010; Putnam-Hornstein & King, 2014), underscoring the idea that socioeconomic status is a substantial driver of adolescent births.

The Current Study

Current research on the incidence and prevalence of early childbirth among adolescents in foster care, particularly in the United States, is limited by both the selection of the base population and the method for identifying those who give birth. In addition, there are few studies and seemingly contradictory findings with respect to differences in early childbearing between maltreated adolescents who spend time in foster care compared to those that remain at home with their families. As a result, there is a need for a longitudinal examination of early childbearing among adolescent girls with a history of substantiated maltreatment that assesses variation in the likelihood of giving birth according to whether or not child welfare interventions included placement in foster care. Given these limitations, the most feasible method of determining who gives birth and when among the population of adolescent girls with current and historic

involvement with child welfare services is augmenting longitudinal child welfare data through linkages with vital birth records (Svoboda, Shaw, Barth, & Bright, 2012).

This study is based on a newly linked, population-based dataset consisting of vital birth records for the years 2001-2010 matched to case-level administrative child welfare service records for adolescent girls involved with the child welfare system between 1999-2010. These data were used to answer two questions:

1. *What is the prevalence of early childbirth among adolescent girls in foster care in California?*

2. *Is a history of foster care placement associated with higher rates of early childbirth among maltreated girls in California?*

These questions will be answered with two distinctive analyses, which used two separately constructed datasets derived from the larger set of administrative linkages. The first analysis is cross-sectional, examining births to girls in foster care annually for a five-year period. The second analysis is a prospective cohort study, using longitudinal data to assess differences in the rates of a first birth depending on whether or not maltreated girls involved with child welfare experienced an entry into foster care. Each of these analyses will be discussed in the following sections, including detailed follow up questions, an overview and rationale for the study design, and specific hypotheses.

Analysis 1
What is the prevalence of early childbirth among adolescent girls in foster care in California?

The goal of this first analysis was to construct a birth rate for adolescents in foster care in California that was directly comparable to the birth rate for the full population of adolescents in the state. Little is known about the epidemiology of giving birth in foster care, and this analysis provides the first population-based data on this issue in the United States. As such, annual birth rates among female adolescents (aged 15–17) in foster care during the same year they gave birth were computed for the five-year period between 2006 and 2010. These rates were compared to statewide birth rates for similarly aged girls in the general population. The same comparisons were generated for the three largest racial/ethnic groups in foster care in the state (Latina, White, and Black). Additional questions involved just the girls in foster care during each year. Specifically, how did birth rates vary by foster care-related characteristics, such as length of time in care, placement stability, and removal reason? Among those who gave birth, what was their foster care status as of the day their children were born? Were they in care on the estimated date of conception?

The base population (or denominator) chosen for this analysis was adolescent girls aged 15–17 in foster care in California at any point during the year. This denominator was selected for a number of reasons: 1) it is more akin to a population-based denominator; 2) a point-in-time denominator (e.g. July 1) is more likely to capture those who have been in care for longer periods of time; and 3) it allowed for the opportunity to include births occurring just before or after an episode in care but during the same year. The age group restriction is also worth noting. Young adolescent girls (aged 12-14) are far less likely to give birth than their older adolescent

counterparts (California Department of Public Health, 2010), yet they represent a substantive proportion of adolescent girls in foster care in California (Needell et al., 2014). On the other hand, older adolescents represent a much smaller proportion of young people in care (particularly before the passage of Assembly Bill 12 in California, which went into effect in 2012 and extended foster care through age 20), but rates of birth increase significantly after age 17. Including either of these groups in rates calculations could have biased the estimates and mischaracterized this phenomenon.

Birth rates for the general and foster care populations across race/ethnicity were compared given well-documented racial and ethnic disparities for both adolescent births (Blum et al., 2000; Finer & Zolna, 2011; B. Hamilton & Ventura, 2012) and placement in foster care (Derezotes et al., 2005; Magruder & Shaw, 2008; Needell et al., 2014; Putnam-Hornstein, Needell, et al., 2013; Wulczyn et al., 2013). The aim was to assess whether or not disparate rates of adolescent childbearing observed in the general population would carry over into the foster care population.

Computing birth rates among girls in foster care during the year across foster care experiences provides useful data for policymakers and practitioners by highlighting characteristics of adolescent girls that may be associated with early childbearing. Because of the cross-sectional nature of the data constructed for this analysis, associations between particular placement experiences and high rates of birth can point to subpopulations of girls in foster care that may benefit from increased services and supports to either help delay pregnancy or adequately support those who are parenting. The limited research on the effect of different foster care placement experiences indicates that girls with lower levels of placement stability may be more likely to get pregnant or give birth as an adolescent (Dworsky & Courtney, 2010; Dworsky & DeCoursey, 2009). With respect to placement type, the results were mixed. One study comparing kinship care to non-relative foster care found that kinship care was associated with a higher risk of pregnancy (Sakai, Lin, & Flores, 2011). Another study found that among older adolescents in care, the hazard of getting pregnant was significantly lower among those placed in congregate care compared to those who had never been in congregate care (Dworsky & Courtney, 2010).

Lastly, among girls in foster care who gave birth, determining whether or not they either conceived their pregnancy or gave birth while they were in foster care will provide further information on how much opportunity the child welfare system has to intervene – if a significant proportion of girls who give birth in care either get pregnant or give birth before entering care, the target of services and supports will shift from a focus on prevention to a goal of support.

Hypotheses. Based on the research reviewed, the following hypotheses were tested:

1. *Adolescent birth rates will be higher among girls in the foster care population compared to those in the general population*. Birth rates were expected to be higher among foster youth given the disproportionate rate at which adolescents in foster care experience the conditions and circumstances that have demonstrated an association with adolescent childbirth. Additionally, the rates calculated for this analysis had similar limitations to previous work that did not account for socioeconomic factors linked to early parenting, which will have effect of comparing adolescents in the general population from a range

of socioeconomic backgrounds to a more homogenous population of low socioeconomic status adolescents in foster care. Notwithstanding this limitation, it was expected that the differences between the foster care population and the general population would be less pronounced than previous research indicated.

2. *Racial/ethnic disparities in adolescent childbearing will be observed within the foster care population and Black and Latina adolescents in care will be more likely to give birth than White adolescents in care*. Racial/ethnic disparities documented among the general population are expected to persist in the foster care population, despite the fact that, as previously indicated, adolescents of all racial/ethnic groups who are in foster care are more likely to come from socioeconomically disadvantaged backgrounds.

3. *Girls who have had multiple moves while in care will have higher birth rates compared to those in more stable placements*. Among foster care placement characteristics, a hypothesis is only offered for the association of placement stability and adolescent births given the well-documented relationship between placement moves or disruptions and other adverse outcomes. For the remainder of foster care placement characteristics, the analysis is purely exploratory.

Analysis 2
Is a history of foster care placement associated with higher rates of early childbirth among maltreated girls in California?

This second analysis aimed to examine further the relationship between placement in foster care and early childbearing. Existing research on the effect of foster care on pregnancy and/or childbirth among maltreated female adolescents is both limited and contradictory. As a result, this analysis computed the cumulative rate of a first birth among a cohort of adolescent girls who were reported for abuse or neglect, investigated by child protective services, and substantiated for maltreatment. The focus of the examination was to determine whether or not placement in foster care (vs. remaining at home with parents/caregivers) was associated with a higher rate of a first birth as an adolescent and whether or not this association was modified by race/ethnicity and a number of maltreatment-related experiences.

As previously described, disparities with respect to both adolescent childbearing and child welfare involvement mean that accounting for the influence of race/ethnicity is necessary. Maltreatment has demonstrated a strong and consistent association with adolescent pregnancy, with the strongest effects observed among those who experience sexual and physical abuse. Recurrence of maltreatment, while untested in terms of adolescent childbirth, has been associated with delinquency and criminal behavior (C. E. Hamilton, Falshaw, & Browne, 2002; Lemmon, 2006). The influence of experiencing more than one type of maltreatment has also not been assessed with respect to adolescent childbirth, but multi-type maltreatment has been associated with a higher severity of abuse (Clemmons, Walsh, DiLillo, & Messman-Moore, 2007) and difficulties with adjustment and externalizing behaviors in adolescence and adulthood (Arata, Langhinrichsen-Rohling, Bowers, & O'Brien, 2007; Higgins & McCabe, 2000).

This is a prospective cohort study, which follows 81,167 maltreated girls in California who experienced a first substantiated allegation of maltreatment after their 10th birthday to

identify those who entered foster care and who had a first birth as an adolescent. The longitudinal nature of the child welfare service data used for this analysis allowed for an assessment of the association between foster care and a first birth during adolescence. Captured in these data were girls with a range of maltreatment experiences, which allowed for an assessment of how these experiences were related to giving birth for the first time and how they might influence the relationship of interest – the association between foster care and early childbearing.

The study population was limited to girls who experienced a substantiated allegation of maltreatment after their 10th birthday. This age restriction was primarily driven by limitations inherent in child welfare service records, which are only reliably available since 1999. As a result, complete histories could not be constructed for the full cohort of girls in the study (those born between 1989 and 1993). It is also unknown whether there were any reports of maltreatment prior to 1999. As such, the dataset included those girls with a first *known* maltreatment substantiation occurring after their 10th birthday. In addition to the limitations of the data, previous research has indicated that experiencing maltreatment during adolescence may be more strongly associated with teen pregnancy and childbirth than if abuse occurs earlier in childhood (Smith, Thornberry, & Ireland, 2004; Thornberry et al., 2001; Vinnerljung et al., 2007).

Survival analysis was used to model these relationships given differences in age when girls experienced a substantiated allegation of maltreatment, entered foster care, or gave birth for the first time, as well as right-censored birth data for the youngest girls in the cohort (see Chapter 3 for further details). The time period between first entry into foster care and a subsequent first birth is varied and it cannot be assumed that the hazard of a first birth is proportional across cases when the exposure is time-sensitive. As a result, an extension to the Cox proportional hazards model, which allows for a time-dependent exposure, was used to account for these variations. Both unadjusted and adjusted models were specified to determine the association between foster care and a first birth as a teen and whether and how race/ethnicity and maltreatment-related variables modify this association. As previously described, given the disparate involvement in child welfare services across race/ethnicity and higher birth rates among Black and Latina adolescents in the general population, both the unadjusted and adjusted hazard models were stratified for the three largest racial/ethnic groups in foster care.

Hypotheses. Based on the research reviewed, the following hypotheses were tested:

1. *Rates of first birth will be higher among maltreated girls placed in foster care compared to those that remain at home.* Because adolescents who enter care are presumed to be at greater risk of harm if they remain at home, it was expected that foster care would be associated with higher rates of first birth. That said, it is expected that this difference will be relatively modest given the fact that maltreated girls involved in the child welfare system are a population with an already high concentration of factors associated with early childbearing.

2. *Experiencing repeated and multi-type maltreatment, as well as more serious forms of maltreatment (sexual abuse, physical abuse, and neglect) will be associated with higher rates of a first birth*. Research has documented relationships between more severe

experiences of maltreatment and adverse outcomes, as well as adolescent childbirth. Based on this literature, it was predicted that those girls who experienced more than one incident of substantiated maltreatment and more than one type of maltreatment would have higher rates of first birth. The literature has also consistently demonstrated that there is a strong association between sexual abuse and adolescent childbirth.

3. *Among maltreated girls, Latina and Black adolescents will have higher rates of first birth than their White counterparts*. *The relationship between placement in foster care and early childbearing will vary for each of the three largest racial/ethnic groups*. As with the previous analysis, it was expected that disparities observed in the general population would also be detected among the population of adolescents with involvement in the child welfare system. Research has documented that there are racial/ethnic disparities with respect to child welfare involvement and entry into foster care, but there are also racial/ethnic differences in the experience of foster care placement, including placement type, length of stay, and reasons for exit (Boyd, 2014). All of these differences may contribute to variation in the association between foster care and adolescent childbirth.

Organization of the Dissertation

The remainder of this dissertation is structured into four chapters. The second chapter will review the research and theoretical literature to provide a conceptual framework for understanding the context and etiology of pregnancy and childbirth among foster youth and the role of the child welfare system in responding to the issue of early childbearing in foster care. The third chapter will describe the methodology for the study in detail, including: how data used for these analyses were generated and linked, key variable construction and coding, analytic methods, and protocols regarding the protection of human subjects. The fourth chapter will provide a summary of the results for each of the analyses. The final chapter will discuss these results, including a reflection on the original hypotheses, the limitations of the study, and the implications for future research and child welfare practice and policy.

CHAPTER 2: CONCEPTUAL FRAMEWORK

This chapter will provide critical and theoretical background to help conceptualize the issue of childbirth to adolescents in foster care. The central theme for this background is the association between adolescent childbearing and social position, which is primarily represented by race/ethnicity and socioeconomic disadvantage. Because of income and racial/ethnic disparities in child welfare involvement and foster care placement, a primary explanation for higher rates of adolescent childbirth among adolescents in care is the higher concentration of adolescents who are Black, Latina, and/or come from socioeconomically disadvantaged households and communities.

The construction of adolescent childbearing as a social problem has been based, at least in part, on research which has demonstrated that adolescents and their children are adversely affected by the timing of childbirth. In response to this framing and the research that sustains it, a number of researchers have conducted rigorous research to distinguish whether poor outcomes associated with adolescent parenting were driven by fertility timing or by the same socioeconomic circumstances that gave rise to early pregnancy. One of these researchers used this evidence to develop a theory of early fertility, which posited that it was an adaptive strategy in the face of extreme disadvantage, particularly for Black adolescent girls. Since this theory counters much of the research on early parenting that tends to frame adolescent pregnancy and parenting in terms of psychopathology or dysfunction, a theory of psychological development will be discussed that helps to contextualize the impact of social position on developmental outcomes. The child welfare system has limited resources and capacities to address the effects of marginalization as a result of social position. That said, there is a role for the child welfare system to respond to the issue of childbirth among adolescents in foster care, which will be discussed.

Adolescent Childbearing as a Social Problem

Adolescent childbearing in the United States has been redefined as both a deviant behavior and a social problem only relatively recently. Since the early 1970s, the "epidemic" of teenage motherhood has garnered significant and often antagonistic public attention, in spite of the fact that in general, births to teenage mothers have been markedly lower since the 1950s (Furstenberg, 2007; Geronimus, 2003; Luker, 1996). Much of the negative characterization of this phenomenon has focused on a persistent and singular image – that of the Black, poor, urban, unmarried teenage mother seeking financial remuneration and dependence on a strapped, enabling welfare system (Bonell, 2004; Luker, 1996). That the birth rate among Black teenagers is disproportionately higher than rates for White teenagers only adds fuel to this characterization.

The disadvantaged circumstances of adolescent mothers and their offspring have also contributed to the perception of teenage mothers as both a cause and a consequence of poverty. Studies have documented poor educational outcomes and economic outcomes among teen mothers, both in the short term and as they age (Boden et al., 2008; Coley & Chase-Lansdale, 1998; Furstenberg, 1976). However, much of the research on this issue suffered from selection bias since the socioeconomic conditions present prior to pregnancy were not necessarily factored into these analyses. When adequately controlling for the circumstances under which adolescents gave birth, namely poverty, structural and institutional racism, and poor educational, vocational,

and access to health care or when examining outcomes into adulthood, the long-term negative effects of early childbearing were minimized or disappeared altogether (Furstenberg, Brooks-Gunn, & Morgan, 1987; Furstenberg, 2007; Geronimus & Korenman, 1993b; Hoffman & Maynard, 2008).

Additional studies have measured the causal impact of teenage childbearing on educational and vocational outcomes by comparing adolescent mothers with similarly situated adolescent girls who could provide a reasonable counterfactual outcome (i.e. what would have happened if an adolescent mother delayed giving birth; Ashcraft & Lang, 2006; Fletcher & Wolfe, 2009; Geronimus & Korenman, 1993b; Hotz, McElroy, & Sanders, 2005). Findings have indicated that in general, the effect of teen childbearing on educational outcomes, labor market participation, and level of income is minimal at best, and that delaying childbirth would not have improved young women's circumstances in these arenas. Reflecting on the body of literature on adolescent parenting, Frank Furstenberg (2003) concluded: "…it now seems evident that early childbearing is neither a potent nor a permanent cause of long-term poverty and disadvantage among women who would have otherwise escaped this fate had they only waited to have their first child." (p. 32) In other words, adolescent childbearing itself does not perpetuate socioeconomic disadvantage and it framing as a damaging social problem may be a mischaracterization.

Adolescent Childbearing as an Adaptive Strategy

Arline Geronimus has argued that early childbearing among Black urban adolescents is adaptive in the face of extreme inequality and socioeconomic disadvantage, in spite of exhortations by policy-makers that teenage parenting is uniformly destructive (Geronimus, 1991, 2003). Based on research both she and her colleagues conducted, she developed a theory of early childbirth among Black adolescents living in high poverty urban areas. Her central argument is that structural factors constrain healthy life expectancy for this population and that cultural norms for the timing of birth have shifted to accommodate this reality.

Geronimus theorized that Black women living in urban environments with extreme disadvantage experience a rapid decline in health beginning in their mid 20s in a process called adverse "weathering" (Geronimus, 1991; Geronimus et al., 2010; Geronimus, Hicken, Keene, & Bound, 2006). Evidence she used to support this argument as it related to fertility-timing included: rapidly increasing mortality rates between the ages of 15 and 29 among Black women (compared to White women); disparities with respect to the effects of hypertension, low-level lead exposure, and smoking over the reproductive age span; and racial differences in pregnancy and childbirth related outcomes as women age. On the last point, one of her studies found that compared to Black adolescent mothers, Black mothers in their 20s were more likely to have low birth weight babies and to smoke cigarettes or drink alcohol during pregnancy and less likely to breastfeed or utilize well-child pediatric care in the first 6 months of life (Geronimus & Korenman, 1993a). The reverse was true for White teens and young women.

She argues that cultural and social expectations motivating early fertility timing among extremely disadvantaged populations may actually be rational and advantageous given these health constraints. One advantage to early fertility is giving birth when the mother is at her optimum level of health. Another is that the children of adolescent mothers, in this scenario of

declining health and when coupled with a multi-generational family structure, will have both parents and grandparents available as relatively healthy caregivers over the course of their childhood. They might also be "buffered" from the worst effects of extreme disadvantage, since their mother is potentially embedded in extended network of supportive kin (Geronimus, 1991, 2003). She argues:

> This theoretical synthesis emphasizes the harsh conditions under which families in poverty must manage and the strength and creativity they may muster in developing cooperative arrangements for dealing with them. It is a misreading to suggest that these arrangements are without costs themselves, or that they solve perfectly the problems of the poor, or, conversely, that the need for interventions by the larger society is not compelling. (Geronimus, 1991, p. 466)

While the demographic profile of being Black, poor, and living in an urban setting may only apply to a segment of adolescent girls in foster care, Geronimus's conceptualization is important because it helps to disrupt the notion that adolescent childbearing is a uniformly deviant and damaging act. Further, it provides one pathway for how social and economic conditions affect the chance that adolescents will become parents. It also exposes the idea that the ultimate decision to parent is not necessarily irrational or the result of individual psychopathology; rather, it originates from differences in environments, resources, constraints, and the resulting and inevitable cultural variation in family ideals and patterns of family-related behavior (Geronimus, 2004). Much of the research on correlates of adolescent childbirth describe it as a developmental outcome to be avoided, which is in conflict with a theory that characterizes it as a normative and adaptive response to conditions of extreme socioeconomic disadvantage.

Adolescent Childbearing as a Developmental Outcome

Psychological theories of childhood and adolescent development consider the influence and primacy of more individualized processes in evaluating outcomes. Including only those mechanisms in a conceptualization of childbearing among adolescents in foster care is potentially limited considering the following factors: 1) teen pregnancy and parenting has been consistently linked to both race/ethnicity and socioeconomic disadvantage; 2) the existence of racial/ethnic disparities in child welfare involvement; and 3) a theory of early parenting which posits that early childbearing is adaptive under conditions of severe disadvantage. As such, a theory to help contextualize this issue in terms of development needs to be able to integrate issues related to environmental and social disadvantage.

Most integrative theories of development begin with individual characteristics and immediate familial influences that may be impacted by a usually unspecified social context. For example, ecological theory posits that development is characterized by progressively more complex reciprocal interaction between the developing person (as a biopsychological entity) and their immediate (proximal) and more remote (distal) environment (Bronfenbrenner, 1999). Bronfenbrenner (1999) maintains that proximal processes are primary and suggests that some children's distal circumstances may be such that their influence may be more impactful. In those cases, the resources required of the proximal environment may need to be more substantial to counteract those influences. This model also echoes the risk and resilience framework in which resilience is defined as a "dynamic process encompassing positive adaptation within the context

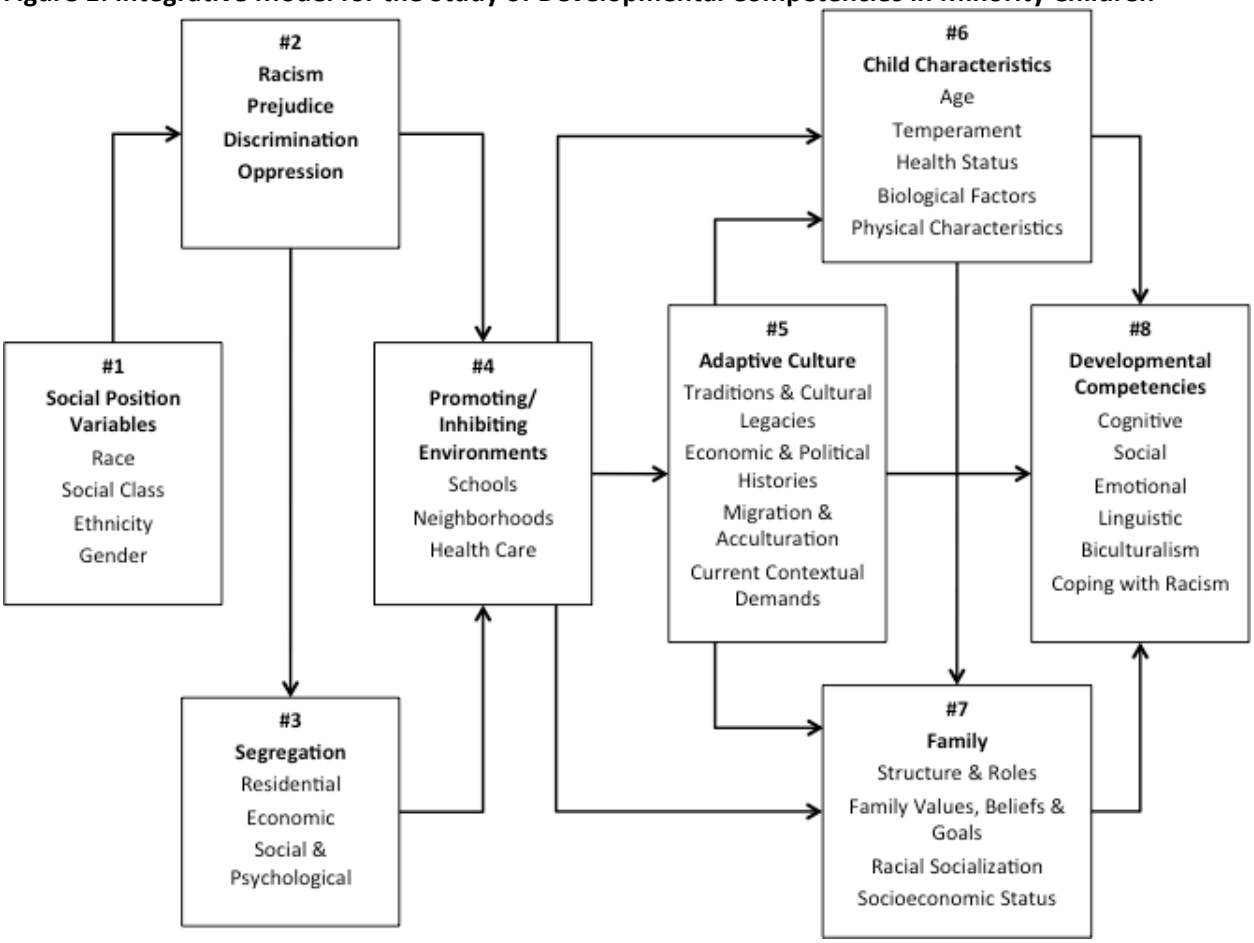
of significant adversity" (Luthar, Cicchetti, & Becker, 2000, p. 543). Both risk and resilience factors can be attributed to the child, the family, or the social environment, but few scholars have articulated or measured risk factors in the social environment that contribute to vulnerability or resilience, particularly with respect to children from marginalized backgrounds. Other than socioeconomic status, most risk factors are related to person-level events and circumstances (Masten, 2001; Masten et al., 1999), rather than the chronic and largely indirect risk of being born into a particular social category that may confer significant disadvantage over the course of development.

Developmental Mechanisms among Children of Color

García Coll and colleagues (1996) propose a theoretical model that specifies developmental mechanisms unique to children of color and their families, which places the influence of social position at the core of an integrative process rather than at the periphery. The model does not suggest that individual development for children of color operates differently from White children, but it emphasizes the impact of social stratification in defining both the contextual challenges and the necessary competencies that are specific to non-majority populations in the United States. The authors argue that mainstream theories of development have less relevance and applicability to children of color because of the centrality of their social position, which often places them at the lowest levels of a stratification system based on class, race, ethnicity, and culture. Their model proposes a method for understanding the mechanisms of development within such a context, which is illustrated in Figure 1. The authors offer this framework as a "heuristic guide" to research on developmental competencies for children of color. As such, this integrative model is particularly useful for understanding the developmental context for early childbearing among Black and Latina adolescents, who represented at high and sometimes disparate rates in foster care.

The model posits that developmental outcomes for children are profoundly impacted by their social position within a given society's social stratification system. Three assumptions underlie the discussion of social position and social stratification: 1) social position is associated with some form of social, psychological, spatial, and/or physical segregation; 2) the degree of social mobility is dependent on social position; and 3) individuals develop a "hierarchical attribution system" that involves their attitudes and beliefs about worth, utility, and importance based on their relative position on the social ladder. Race, socioeconomic status or class, ethnicity, and gender are the social position variables that communicate such attributions and often determine differential rewards and access to resources. The impact of social position on development is indirect and is mediated in its pathway by social stratification mechanisms of racism, prejudice, discrimination, and oppression (as indicated in Figure 1). Segregation is another mediator through which social position and stratification mechanisms impact developmental outcomes. Although segregation (residential, educational, etc.) is technically illegal, the authors argue that de facto separation and segregation of groups and individuals based on their social position are "ongoing facts of life in the United States" (García Coll et al., 1996, p. 1900).

Figure 1: Integrative Model for the Study of Developmental Competencies in Minority Children



Adapted from García Coll, et al. (1996)

Mechanisms of social stratification and the experience of segregation both have a direct influence on children's environments (schools, neighborhoods, and health care settings). That influence can be particularly impactful to children of color because segregation and stratification are such primary shapers of their developmental trajectory, according to this framework. The impact can make children's environments inhibiting or promoting (or both simultaneously) to the process of developing competencies. Adaptive cultures consist of the values, attitudes, goals, and behaviors that develop as a direct result of both social stratification mechanisms and the inhibiting or promoting environments engendered by these mechanisms and by segregation. How groups adapt is a product of the collective history and the current social challenges faced by families and communities of color. Adaptive cultures include culturally defined coping mechanisms, such as the development of kinship or extended social networks.

Child characteristics are critical because they are both influenced by and contribute to other processes that impact developmental competencies. Their promoting and/or inhibiting environmental contexts and the adaptive cultures that have evolved in response to that context directly influence children's individual characteristics. The key mechanism is how the interaction

of cultural and environmental conditions with individual characteristics, impact development and which of those individual characteristics might be particularly relevant to successful developmental outcomes for children of color. Family functioning is also directly influenced by social context through promoting or inhibiting environments and how the culture has adapted to such conditions. Marginalized families, the authors maintain, can be differentiated from mainstream families by: the structure and roles within the family; family values, beliefs, and goals; racial socialization; and socioeconomic status and resources. Developmental competencies are the outcomes of this process and refer to the functional capacity of children as well as the emerging skills that they bring to each of their interactions in their multiple contexts.

In sum, the integrative model proposed by García Coll and colleagues presents an opportunity to examine the direct and indirect impacts of social position and social stratification on the ecological contexts that shape marginalized children's development. Further, the model specifies the mechanisms that buffer or moderate the potentially destructive influence of structural disadvantage in various aspects of functioning. In the case of adolescent pregnancy, this theory provides a framework for understanding why and how fertility-timing norms as proposed by Geronimus are both generated and transmitted during development and how early parenting among poor Black and Latina adolescents might be an adaptive response to the cumulative and interactive effects of social disadvantage. Much of the theory covered thus far has focused on events occurring outside of the influence of foster care, the next section will consider the role of the child welfare system in responding to these issues.

Adolescent Childbearing as a Concern for Child Welfare

Early parenting among youth exposed to foster care may result from a combination of a number of psychological and service-based functions, including the impact of maltreatment, engagement in high-risk sexual activity, lack of access to reproductive health services and supports to help make decisions regarding sexual behavior and family planning, and the desire to have a child in order to create family and stability. Additionally, the cumulative and intersectional impact of race/ethnicity, class, and gender in a highly racialized and economically stratified society are compounded by the potential loss of communal and familial buffers as a result of being in foster care. While marginalized children outside of foster care may contend with a number of similar challenges during their development and as adolescents, the experiences of maltreatment, being separated from family, and spending time in care, combined with the addition of yet another stigmatized identity—that of a "foster youth"—add to the cumulative disadvantage faced by adolescents in care. The child welfare system is limited in its capacity to address the full spectrum of these issues; indeed, it is well beyond the scope of child welfare and its available resources to prevent or intervene in the processes that generate this disadvantage (Berrick, 2009). Once adolescents are involved in the child welfare system, however, there is both an obligation and an opportunity to ensure that there are adequate services and supports to maximize their sexual and reproductive health and to make informed decisions regarding parenting as a teenager.

Although concern regarding teenage motherhood has emerged over the last forty years, the history of state intervention into the sexual and reproductive lives of young women extends to the origins of the institutions developed to protect and rehabilitate wayward youth at the turn of the twentieth century (Alexander, 1995; Luker, 1998; Odem, 1995). The British doctrine of

parens patriae (father of the nation), which followed early American settlers and allowed the state to assume control of children whose parents were deemed unfit or incapable of parenting took on new life in the Progressive Era as social workers began to identify that girls' deviance was the result of moral, mental and physical degradation of their family and social environments (Odem, 1995; Trattner, 1999). One institution that developed within this context is the juvenile court; its history of managing female sexuality is often characterized as coercive and its advocates and workers as agents of social control (Feld, 2007; Luker, 1998; Platt, 1969).

In spite of its critics and its tainted history, the notion of *parens patriae* continues to define the operations of the modern juvenile court, which acts at the legal core of the child welfare system. Although legally responsible for the children and youth that it removes from their parents, the child welfare system is increasingly hesitant to accept the moral and emotional burden of parenting the children in its care. This reluctance arises from two distinct origins. The first is a legitimate desire to avoid coercive and unnecessarily restrictive responses of the past. The second is the need to respond to the legal mandates and expected outcomes for child welfare services in the United States. These outcomes include children's safety, avoiding foster care placement if possible and when moving children in care to a permanent situation (whether that be reunification, adoption, or kinship or guardianship care) as quickly as possible (Courtney, 2009). Foster care is therefore intended as a transient solution – ideally, what is provided between the time that a girl is removed from her caregivers and the time when she is returned to their care or an adequate substitute is secured. The idea that the state (as embodied by the child welfare system) should be accountable for parenting during this time appears to be antithetical to the presumed reality that the child's "true parents" are waiting in the wings to resume (or initiate) the mantle of parental duties.

Unfortunately, some children and youth do not resume a normative parenting relationship within a short time frame and some emancipate from foster care without ever achieving permanence. And because the capacity to accurately predict which children and youth entering foster care are least likely to exit to a permanent outcome is limited (McDonald, Poertner, & Jennings, 2007), the state's obligation to actively parent any child that enters foster care becomes a critical issue without an easy solution. A further issue is how to negotiate the tension between the problematic history of coercive state intervention into the reproductive lives of unmarried adolescent girls and the duty of the state to effectively "raise" the children in its care, even if that responsibility is temporary.

Summary

While the analyses conducted for this dissertation are largely unable to attend to the dynamics and theoretical constructs discussed in this chapter, these ideas are important to both the framing of the issue in child welfare and the implications for policy and practice. The social and developmental contexts that may make parenting more likely among adolescent girls in foster care necessitate a response. This potential response is challenged by the limited ability of the child welfare system to address issues beyond ensuring the safety of children and helping them to achieve permanence, as well as the need to effectively balance the tension between social protection and social control.

CHAPTER 3: METHODOLOGY

This study used newly linked administrative child welfare service (CWS) records and vital birth records for the state of California to answer questions regarding adolescent childbearing among girls in foster care.[1] These were two separate analyses designed to assess the relationship between exposure to foster care and giving birth as an adolescent in two different ways. The first analysis utilized cross-sectional data to generate annual adolescent birth rates to girls in foster care for the years 2006 to 2010. These rates were compared to general population birth rates for all girls in California and then by race/ethnicity. Birth rates were also produced across characteristic foster care experiences. The second analysis employed a population-based prospective study design, following a cohort of girls who experienced a first substantiated allegation of maltreatment after their 10th birthday and identifying those who entered foster care and those who gave birth as adolescents. Hazard models were used to compare the rates of first birth among girls who entered care versus those who remained at home. This chapter will review how the data were generated and linked, the construction of outcome, exposure, and explanatory variables, the methods used for analysis, and protocols regarding the protection of human subjects.

Data Generation

Data Sources

Child Welfare Administrative Data. California's Child Welfare Services Case Management System (CWS/CMS) is the statewide database for tracking children reported for possible abuse or neglect. Under the leadership of Dr. Barbara Needell (PI), the California Child Welfare Indicators Project (CCWIP) at the University of California, Berkeley hosts this data archive through a longstanding interagency agreement with the California Department of Social Services (CDSS).

Since 1998, CCWIP has received quarterly extracts of CWS/CMS data from CDSS, which are configured longitudinally and updated each quarter. These data are organized into a number of tables for analysis and dissemination purposes. For this study, data were extracted from three different tables, which are linked by an encrypted common identifier (FKCLIENT_T): (1) The referral table holds intake data for any child that has been reported for maltreatment, such as the date of referral, the disposition, and the type of maltreatment alleged. (2) The foster care table contains information regarding placement for any child who enters foster care, including date of placement, episode dates, placement type, and reason for discharge from care. (3) The client table holds all confidential identifying information, such as the child's first and last names, social security numbers, and addresses.

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[1] Data for these analyses were drawn from an extensive set of linkages that were conducted for a larger project examining antecedents and outcomes of childbirth among youth involved with child welfare. This study, called "Pregnancy, Parenting, and Intergenerational Maltreatment: A Population-Based Examination of Youth Involved with Child Protective Services," was funded by the Conrad N. Hilton Foundation. The study was conducted at the University of Southern California, School of Social Work (PI: Dr. Putnam-Hornstein) with collaboration from CCWIP and CDSS. As an investigator for the project, I was responsible for establishing all of the linkages for the study. The description of the linkages represents the work done for this larger set of linkages.

It is important to note that CDSS switched to a new case management system (CWS/CMS) in 1998 so data on children's involvement with the child welfare system are only available since then. Because of the challenge of adjusting to the new system, data for 1998 is somewhat less reliable than in subsequent years. As a result, complete and reliable histories of child welfare involvement are only available for those children born in 1999, except for those children who were in foster care during the transition to the new system since their records were updated and transferred to CWS/CMS.

Vital Birth Records. Confidential vital birth records were obtained from the California Department of Public Health's Center for Health Statistics for all births between 2001 and 2010. These data include the child's identifying and birth information, maternal characteristics and health history (e.g., age, past pregnancies, date prenatal care began), maternal and paternal (when available) identifying information, and other demographic data.

Population Data. Annual counts of the adolescent females in the general population of California were derived from intercensal population estimates from the California Department of Finance (2012, 2013). These estimates are stratified by gender, age, and race/ethnicity.

Record Linkages

In the simplest terms, record linkage combines information from two or more different records that are believed to belong to the same individual (Herzog, Scheuren, & Winkler, 2007). It can either take the form of deduplicating records from the same data file or linking records across files. Record linkages for the present study took the latter form. Namely, this linkage merged information about mothers on vital birth records with child welfare service records in which they were reported as an alleged victim of maltreatment and/or placed in foster care.

Records can be linked when either their values match exactly or through the use of statistical methods to determine the level of similarity between data elements in pairs of records from two different sources (Campbell, Deck, & Krupski, 2008). There are two established methods for record linkage: deterministic and probabilistic. Deterministic linkages typically require that identifiers from each set of records match exactly (Herzog et al., 2007). The benefit of this method is that the positive predictive value (the proportion of linked records that are valid matches) is high and there are fewer false matches (Campbell et al., 2008). On the other hand, deterministic linkage strategies suffer from reduced sensitivity, particularly when the records being linked are very large; lack consistent and verified unique individual identifiers (e.g. Social Security Numbers); or have missing values or typographic errors in key identifiers. Probabilistic linkages use statistical methods and have the benefit of increased sensitivity as potential records can be matched even if they contain incomplete or errant data. The drawback of course is a greater number of false matches, although probabilistic methods have been rigorously tested and when combined with clerical review, their positive predictive value can be maximized (Campbell et al., 2008; Gomatam, Carter, Ariet, & Mitchell, 2002; Jaro, 1995; Nitsch, Morton, DeStavola, Clark, & Leon, 2006). This study utilized a probabilistic matching strategy to link mothers on birth records to their child welfare service records.

Linkage software. Record linkages were completed using Link Plus, a standalone probabilistic matching program that was developed by the Center for Disease Control (CDC)

Division of Cancer Prevention and Control (Link Plus, Version 2.0). Although Link Plus was originally designed for use with cancer and death registries, it has the ability to link other administrative datasets in fixed width or delimited formats. It is shareware and available for download from the CDC website: http://www.cdc.gov/cancer/npcr/tools/registryplus/lp.htm. Link Plus establishes possible matched record pairs based on a combination of unique (i.e., Social Security Number) and non-unique (e.g., first name, date of birth) identifiers common to both administrative data sources (Division of Cancer Prevention and Control, 2007). These pairs are created using a formal statistical model developed from Felligi and Sunter's (1969) theory for record linkage. Basic concepts from this theory and the statistical methodology underlying the Link Plus matching process will be briefly reviewed.

Underlying methodology. The ultimate product of the record linkage process is two sets of record pairs: the set of true matches (M) and the set of non-matches (U). In order to partition potentially matching records, a composite score is assigned indicating the similarity of a pair of records. The foundation of this score is calculated from the ratio of two conditional probabilities (Herzog et al., 2007). The first is the *m* probability, which is the probability that the values of matching variables will agree when the pair of records belongs to the same person. The second is the *u* probability, which is the probability that the values of matching variables will agree purely by chance and the pair is actually a non-match (Blakely & Salmond, 2002). The ratio of these two probabilities will be large when agreement patterns are found more frequently among matching records and small when agreement patterns are more common among non-matches. The base 2 logarithm of the ratio of the *m* and *u* probabilities across matching variables generates the score for each record pair, which is also known as the total agreement weight (Herzog et al., 2007).

Felligi and Sunter proposed a decision rule to determine whether a record pair is a definite match, a possible match, or a non-match, which involves setting thresholds for the score or total agreement weight (Herzog et al., 2007). All record pairs with scores above the upper cut-point are deemed definite matches. Conversely, all record pairs with scores falling below the lower cut-point are classified as non-matches. Upper and lower cut-points are determined by the a priori error bounds on false matches (records belonging to two different individuals are matched) and false non-matches (records belonging to the same individuals are not matched; Herzog et al., 2007). Record pairs falling between the upper and lower cut-points are considered possible matches and are designated for clerical review.

Matching options within Link Plus. In addition to the basic methodology described above, Link Plus offers additional functionality and user-specified options, such as blocking, matching methods, and matching parameters.

Phonetic system. Phonetic systems code a string based on its pronunciation. Link Plus offers two options for phonetic coding systems: Soundex and New York State Identification and Intelligence System (NYSIIS). Soundex codes names with a letter followed by three numbers. The letter is the first letter of the name and the numbers represent the remaining consonants. NYSIIS codes similar phonemes to the same letter and maintains relative vowel positioning. The codes do not require decoding to be pronounced by the reader. NYSIIS was selected because according to the Link Plus documentation, there is a 2.7% increase in accuracy and it has better performance with Hispanic names (Division of Cancer Prevention and Control, 2007).

Blocking variables. Blocking is used to limit the number of pairs being examined by portioning files into exhaustive and mutually exclusive blocks and comparing records only within each block. Link Plus uses an "OR" blocking mechanism, which indexes the blocking variables and compares the pairs with identical values on at least one of those variables (e.g., social security number OR date of birth OR NYSIIS last name; Division of Cancer Prevention and Control, 2007). For the 2001-2006 birth files, blocking variables were social security number, date of birth, and last name. For the 2007-2010 birth files (in which social security numbers were unavailable), blocking variables were date of birth and last name.

Matching parameters. Link Plus offers two options for matching parameters: the Direct method and the Expectation-Maximum (EM) algorithm. The Direct method uses the default (or user defined) *m* probabilities. The EM algorithm is an iterative method to estimating the maximum likelihood where there is incomplete or unmeasured data, as in latent models. In data linkage, the true status of a pair is unknown, which means that there are two latent populations consisting of linked pairs and unlinked pairs. The EM algorithm alternates between an expectation (E) step, which computes an expectation of the likelihood, and a maximization (M) step, which computes the maximum likelihood estimates of the parameters by maximizing the expected likelihood found on the E step (Division of Cancer Prevention and Control, 2007). These parameter-estimates are then used to determine the distribution of the latent variables in the next E step, and the process is repeated. The EM algorithm was selected for this linkage because, according the Link Plus documentation, the *m* probabilities computed from the EM algorithm may be more reflective of the true probabilities since they are derived dynamically from the actual data being linked.

Matching methods. Link Plus offers a number of different matching methods depending on the variable being matched. There is an exact method but there are also partial (or comparator) methods, which can accommodate minor typographical errors, misspellings, and hyphenated names. The Jaro-Winkler metric is a string comparator that measures partial agreement between two strings and accounts for a number of potential errors. The methods that were employed for this linkage are listed below:

- Value-specific: this method is frequency-based and sets weights for matching values. A match on a frequent value is assigned a low weight, while a match on a rare value is given a high weight. This method was used for race/ethnicity.

- Names (first and last): this method incorporates partial and value-specific methods, as well as NYSIIS phonetic code. It accounts for hyphenated names and will match a first name with nicknames from an internal file of known nicknames. Frequencies of names (for the value-specific method) were derived from the CWS record file, since it was the larger of the two files being matched.

- SSN: this method is specifically designed for matching social security numbers. It uses partial matching to account for errors and transposition of digits and will allow for a match when only the last 4 digits of the social security number are available.

- Date: this method uses partial matching to account for missing day and/or month values. It assesses whether dates from two files match on day, month, or year components. If the

comparison pair matches on all three, it will be assigned a high weight (*w*). If the pair matches on year and month only, it will be assigned a positive weight (*w1*) that is lower than *w*. If the pair agrees on year only, it will still be assigned a positive weight (*w2*), but it will be lower than *w1*. The date matching method will check whether the date and month are swapped and if there are transposed digits. This method was used for birth dates for the 2001-2006 birth years, where social security numbers were available to confirm possible matches with problematic birth dates.

- Exact: this method is a character-for-character string comparison method. This method was used for 2007-2010 birth dates, where social security numbers were not available and the thresholds for determining a match were more conservative.

Preparing files for linkage. A critical step for this linkage was to prepare linkage files from each dataset. This preparation included extracting the correct population from the larger datasets, cleaning data to address as many errors as possible, and formatting and standardizing data elements. Table 1 summarizes the Link Plus matching method, the variable names from each dataset, and whether or not the variable was used for matching or as additional information to confirm an uncertain match.

Table 1: Matching Variables from Vital Birth Records and CWS Records

	Link Plus Matching Method	Birth Record Variable	CWS Record Variable	Used for Matching	Confirmation Only
First Name	First name - NYSIIS	mfname	com_fst_nm	x	
Last Name	Last name - NYSIIS	msurname	com_lst_nm	x	
Date of Birth (2001-2006)	Date (CCYYMMDD)	mbthdate_cd	bthdate_cd	x	
Date of Birth (2007-2010)	Exact	mbthdate_cd	bthdate_cd	x	
Social Security Number (2001-2006)	SSN	momssn	ssn	x	
Race/Ethnicity	Value-Specific	mrace_cd	race_cd	x	
Middle Name	--	--	com_mid_nm		x
Child's Last Name	--	clname	--		x
Father's Last Name	--	flname	--		x

Child welfare service (CWS) records. To generate data to link to annual birth records, a master dataset was extracted from CWS/CMS (from Quarter 1, 2012) consisting of unduplicated records for children and youth who were born before 1998 and either reported for maltreatment between 1999 and 2010 or in foster care at any point prior to 2011. From these data, associated identifying information (first, middle, and last names; social security numbers, when available; birth dates; sex; and race/ethnicity) was merged from the client table. These data were extracted using SAS (v. 9.2, SAS Institute Inc., 2008).

Variables used for linkage were systematically reviewed and standardized using Stata (v. 11; Stata Corp, 2011). This process involved correcting or eliminating errant or inconsistent values in order to ensure that the matching possibilities between CWS and vital birth records were maximized. Examples include: recoding values for names such as “UNKNOWN”, “UNK”, or “MISSING” as missing; formatting birth dates as “CCYYMMDD”; recoding as missing any social security numbers that were “000000000” or “999999999”; coding race/ethnicity into five

consistent categories (described under Variables section); and recoding any values that fell outside of the acceptable range as missing.

Once the data were cleaned and standardized, girls and young women were separated from the master data set and divided into files for corresponding birth cohort years, from 2001 to 2010. For each year, a girl or young woman was included if she had a referral or a foster care placement that occurred before the end of the calendar year and while she was between the ages of 12 and 24. For example, in the 2003 birth cohort year, girls were included if their first known report of maltreatment or foster care placement occurred prior to January 1, 2004 and they were born between 1979 and 1991. CWS files were cumulative, representing a larger and larger group of girls and young women with a child welfare history. Variables used for linkage in Link Plus were: the girl or young woman's first and last names; date of birth; social security number, when available; and race/ethnicity. Additionally, the middle name was included as a confirmatory variable for uncertain matches. The CWS/CMS common identifier (FKCLIENT_T) was preserved in the linkage datasets to ensure that each girl's child welfare history could be reconnected to the linked data. The final linkage files were exported as delimited text files.

Vital birth records. Birth records for 2001-2006 were already part of the data holdings at CCWIP. These records had been prepared for previous linkage projects (see Putnam-Hornstein & Needell, 2011; Putnam-Hornstein, 2011; Putnam-Hornstein et al., 2011). However, for the years 2007-2010, raw data from vital birth records needed to be acquired and prepared for linkage.

There are two types of vital birth record files available from the California Department of Public Health, Birth Cohort Files and Birth Statistical Master Files. For 2007-2009, Birth Cohort Files were used. These files contain data for all live births occurring in a calendar year, death information for those infants who were born in that year but subsequently died within 12 months of birth, and all fetal deaths that also occurred in that calendar year. For 2010, only the Birth Statistical Master File was available. This file contains detailed demographic information related to the child, mother, and father, as well as medical data related to the birth, but does not have information regarding infant deaths. All files were delivered on CDROM as ASCII delimited text files. Data dictionaries were written for each birth year, since variables were added, removed, or switched positions on a year-by-year basis, and the data were imported into Stata for coding and formatting.

Identifying information for mothers on birth records was extracted from birth record data for all years of the study (2001-2010). Maternal identifiers included first name and surname (maiden name), date of birth, and race/ethnicity. Social security numbers were only available for the years 2001-2006 because CDPH stopped providing social security numbers with vital birth records in 2007. Data were cleaned and standardized according to the same conventions as the CWS records. Each birth year linkage dataset was restricted to only those mothers who were between the ages of 12 and 24 when they gave birth.

In addition to maternal information, the linkage datasets also included both the father's and the child's last names, the child's date of birth, an indicator for whether it was a live birth or fetal death, and a variable for the type of birth (singleton, twins, etc.). A birth record identifier was generated from the identification number (the birth state file number) for every birth and

was preserved in the linkage dataset to ensure that birth record information could be merged with the linked data.

Clerical Review. As previously described, research regarding the efficacy of probabilistic methods indicate that a high positive predictive value depends on such a review process (Gomatam et al., 2002). Preliminary matches generated by Link Plus underwent a thorough and systematic review. Match status cut-points for assigning whether or not a record pair was a match or non-match were determined through an extensive examination of linked records for each year.

The criteria for confirming an uncertain match was determined a priori and varied based on the available information used for matching. Three additional variables (called ID variables in Link Plus) were used to help identify the status of uncertain matches: the child and father's last names from the birth record and the mother's middle name from her CWS record. For 2001-2006, the following criteria were used to confirm a match:

- First name, last name, birth date, social security number (SSN), and race/ethnicity all matched; or
- At least first name, last name, and birth date matched, with an additional matched variable like partial SSN (6-7 digits) or race/ethnicity; or
- First name, last name, and birth date matched (SSN was missing)
- First name did not match, but birth date, last name, partial SSN, and race/ethnicity matched (in these cases the middle name from the CWS record could help confirm a match if SSN was missing); or
- Last name did not match, but birth date, first name, partial SSN, and race/ethnicity matched (in these cases the father's or child's last name from the birth record could help confirm a match if SSN was missing); or
- First name, last name, race/ethnicity, partial SSN match, and birth date is off by only one digit or the month and day is reversed.

For 2007-2010 (the years in which the social security number was unavailable), the threshold for inclusion was more restrictive. In the absence of a unique identifier to overcome possible data entry mistakes, it was required that the birth date matched exactly. For these years, the following criteria were used to confirm a match:

- First name, last name, birth date, and race/ethnicity matched; or
- First name, last name, and birth date; or
- When only the last name and birth date match, the first name or the second half of a two-name first name from the birth record must match the middle name from the CWS record; or

- When only the first name and birth date match, the last name from the CWS record must match the child's or the father's last name from the birth record or the middle name from the CWS record could confirm the first half of two-name last names on the birth record.

The second phase of confirming matches involved unduplicating numerous CWS records linked to the same birth record for the same year. Very few were errant matches. More often, these were repeat births to the same mother, whether there were two separate birth events in the same year (rare), multiples, or a live birth combined with a fetal death. Since mother-level matches were the parameter of interest rather than the children, it was decided to eliminate additional matches by retaining the mother's record for the match with the highest score, the live birth, or the first birth during the year.

This process produced an extensive set of linkages that include adolescent girls and young women who had contact with the child welfare system between 1999 and 2010 and gave birth between 2001 and 2010 while they were between the ages of 12 and 24. The linkage results are described in Table 2. Datasets used for this study were drawn from these linkages and a subsequent extraction of longitudinal history and analytic variables from CWS/CMS.

Table 2: Vital Birth Record/Child Welfare Service Record Linkage Results

Year	All Births in California	Births to Young Mothers (Age 12-24)	Girls and Young Women with CWS Contact (Age 12-24)	Matches	Young mothers with History of CWS contact	Girls and Young Women with CWS Contact Who Give Birth
	Count	Count	Count	Count	%	%
2001	530,743	164,842	303,841	14,911	9.0	4.9
2002	532,357	161,602	389,029	18,241	11.3	4.7
2003	544,526	161,782	478,427	22,294	13.8	4.7
2004	548,893	162,576	571,130	26,545	16.3	4.6
2005	552,573	163,256	665,436	31,597	19.4	4.7
2006	567,715	170,164	758,817	37,355	22.0	4.9
2007	571,520	169,375	846,951	39,961	23.6	4.7
2008	556,661	162,361	927,301	42,566	26.2	4.6
2009	531,473	150,895	998,763	43,252	28.7	4.3
2010	511,825	139,683	981,229	43,177	30.9	4.4

Note: Linkage results are presented for the larger study from which data for the current study were drawn.

Analytic Datasets

Analysis 1. To determine the prevalence of childbirth among foster youth, five analysis datasets were generated, which include all girls 15–17 years of age in California's foster care system from 2006 to 2010 linked to birth records for all mothers (ages 15–17) in the state. For each year, the placement history for girls in an active foster care episode during the year was extracted from the foster care table of CWS/CMS. These files were merged with the linked CWS to birth records to determine which girls gave birth during the same year they were in care and

while they were between the ages of 15 and 17. The girls who gave birth at any point during the year consisted of three groups: (1) those who were in foster care at the time of birth; (2) those who gave birth after exiting foster care; and (3) those who gave birth before entering foster care. General population birth rates were constructed using vital birth records and population data. Births to 15- to 17- year-old girls in the general population of California were generated from vital birth records for each year. Annual counts of 15- to 17-year-old girls in the state were derived from data available from the California Department of Finance (2012, 2013).

Analysis 2. To assess the incidence of a first birth, this dataset identified the full population of girls who were born between 1989 and 1993 and substantiated as victims of maltreatment for the first time between 1999 and 2010 and after their 10th birthday, as depicted in Table 3. The age restriction was primarily driven by the limitation of CWS records, which are only reliably available since 1999. As a result, complete histories could only be constructed for the oldest girls in the cohort (those born in 1989) from their 10th birthday. To avoid introducing bias from varied child welfare exposure time, the data were censored prior to age 10. Girls with substantiated allegations of maltreatment before their 10th birthday were excluded from the study. Among those who gave birth, they were excluded if the first substantiated allegation occurred after the estimated date of conception. It should be noted that even with this age restriction, it is unknown whether there were any reports of maltreatment prior to 1999. As such, the dataset included those girls with a first *known* maltreatment substantiation occurring after their 10th birthday. In addition to the limitations of the data, previous research has indicated that experiencing maltreatment during pre-adolescence and early adolescence may be more strongly associated with teen pregnancy and childbirth than if abuse occurs earlier in childhood (Smith et al., 2004; Thornberry et al., 2001; Vinnerljung et al., 2007).

Table 3: Years and Potential Ages at Child Welfare Exposure and Childbirth by Maternal Birth Year

	Child Welfare Exposure		Childbirth	
Birth Year	Years	Age	Years	Age
1989	1999-2006	10-17	2001-2009	12-19
1990	2000-2007	10-17	2002-2010	12-19
1991	2001-2008	10-17	2003-2010	12-19
1992	2002-2009	10-17	2004-2010	12-18
1993	2003-2010	10-17	2005-2010	12-17

This cohort of girls was combined with the full population of girls who were born between 1989 and 1993 and were in a foster care placement for at least eight days between 1999 and 2010. This merge identified those who entered foster care after their 10th birthday and after a first known substantiated allegation of maltreatment. This file contained each girls' full allegation and foster care history and was joined with the linked CWS to birth records to further identify those who gave birth to their first child after maltreatment substantiation and while they were between the ages of 12 and 19.

Variables

As described above, the final datasets for each question were substantially different. Although for both questions, the exposure of interest was placement in foster care and the

outcome was giving birth as an adolescent, the origins and construction of these variables also differed. This section will describe and operationalize the variables used for each analysis.

Analysis 1

What is the prevalence of early childbirth among adolescent girls in foster care in California?

Rates for this analysis were computed from all births to girls in foster care during the year. These rates were also generated for the general population, across race/ethnicity, and by a number of characteristic foster care experiences. Variables were drawn from vital birth records, population data, and the foster care placement table from CWS/CMS.

Births. Births were counted for each year (2006-2010) if they occurred during the year and while the mother was between the ages of 15 and 17.

Foster Care. To be included in the study as part of the base population of adolescents in foster care, girls needed to be in an active placement for at least eight days at any point during each year. Girls who ran away from placement may still have had an open episode although they had no active placements during the year. Episodes begin when girls are removed from home; they end when the case is closed. Placements begin and end when girls enter and leave specific foster care placements (e.g., kinship care, congregate care). Excluded from this analysis were girls who had an open episode during the year but no active placement (i.e., they were "on the run" for the duration of the year in which there was an open episode).

Race/Ethnicity. Race/ethnicity is a categorical variable based on the primary race/ethnicity type identified in CWS/CMS and collapsed into the three largest racial/ethnic groups in foster care in California (*Latino, White, Black*). Latino includes those listed as Hispanic, Mexican, South American, Caribbean, Central American (Hispanic), or those for whom Hispanic origin is indicated (regardless of any other categorization). White includes those listed as White, Armenian, European, Middle Eastern, or Romanian. Black includes those listed as either Black or Ethiopian. For births in the general population, race/ethnicity was defined according to the maternal race identified on the birth record. The same race/ethnicity categorization was used for both general population births and counts of adolescent girls in the general population.

Estimated date of conception. Because of missing and improbable values entered for gestational age on a number of records, the actual date of conception was not used. Instead, **t**he date of conception was estimated using the average gestational age (in days) for all adolescent births in California. This time (273.9 days) was subtracted from the date of birth. The resulting date was used to determine whether or not a girl who gave birth was in an active foster care placement as of the estimated conception date (i.e., whether the youth became pregnant while in foster care).

Experiences in foster care. Variables characterizing girls' foster care experiences were coded based on a defined focal episode in foster care. For the base population of girls in foster care, the last episode during the year was specified as the focal episode. For girls who gave birth while in foster care, the focal episode was defined as the episode during which the birth occurred. For girls who gave birth after leaving foster care, the focal episode was defined as the last

episode prior to exit. For those who gave birth and then entered foster care, the focal episode was defined as the first episode upon entry into care following the birth.

Episode length. Episode length was calculated for the base population denominator by subtracting the entry date for the focal foster care episode from the last day of the episode, if there was an exit from care, or the last day of the year for those who were still in care at the end of the year. For the numerator of girls in foster care who gave birth during each year, the episode entry date was subtracted from either: (1) the date the girl gave birth if a birth occurred during the episode or (2) the episode end date if the birth occurred after the episode. Births occurring prior to the start of an episode were excluded from this rate stratification. Since episode length was used to calculate rates, it was coded as a four-level categorical variable based on the distribution in the population (*less than 12 months, 12–23 months, 24–59 months, and 60 or more months*).

Placement stability. Placement stability was also generated from information corresponding to the defined focal episode and like episode length, was also coded as a four-level categorical variable. The coding was based on the number of placements as of the last day of the year, the date each youth gave birth, or the episode end date (*1–2, 3–4, 5–8, 9 or more*). The number of placements corresponds to the level of stability as an indication of how many times a girl moved during the focal episode in care. For example, a girl with one placement could have remained in her first placement during her entire stay in foster care, while another girl who had six placements would have moved a total of five times. As was done for episode length, the subset of girls who gave birth and then entered care was not examined by placement stability.

Episodes in care. Episodes in care was coded as a dichotomous variable indicating whether or not the focal episode was a first or a repeat episode in foster care. Because California transitioned to a new child protection data collection system in 1998, CWS records prior to this date were only available for girls who were in care during the transition or entered thereafter. This variable should therefore be considered a conservative estimate of multiple episodes in care.

Placement type. For the base population of girls in foster care, placement type was generated from the focal placement. For those who gave birth while in care, placement type was coded based on the placement as of the date the birth occurred. For those who gave birth after leaving foster care, placement type was based on the last placement during the focal episode. For those who entered care after giving birth, placement type was coded based on the first placement after entry (*kin or relative home, nonrelative foster home, congregate care, guardian homes/other*). The final grouping was comprised largely of guardian homes, with substantially smaller numbers of girls in pre-adoption placements or court and tribe-specified homes.

Removal reason. Removal reason is a categorical variable encompassing the three most common removal reasons for the focal episode (sexual abuse, physical abuse, neglect). On average, girls removed for other reasons constituted only 5% of the population of those in care during the year and an even smaller proportion of girls who gave birth. Removal reason was generated from the foster care table and does not characterize exposure to maltreatment over time.

Analysis 2

Is a history of foster care placement associated with a higher incidence of early childbirth among maltreated girls in California?

The dependent (or outcome) variable for this analysis was a first birth between the ages of 12 and 19. The independent (or exposure) variable was entry into foster care. Control variables were race/ethnicity and a number of maltreatment experiences, including recurrence, multi-type maltreatment, and maltreatment type. The variables were drawn from vital birth records and the referral and foster care tables from CWS/CMS.

First births. Births for this question were counted if they occurred between ages 12 and 19. Ensuring that only first births were captured was handled in two stages. First, prior to being merged with the cohort of girls who had substantiated allegations of maltreatment, linked CWS to birth record files for each birth year (2001-2010) were appended. Duplicate records (i.e. girls with a history of CWS involvement who gave birth more than once as adolescents) were sorted by the child's date of birth and only the record for the first birth was maintained in the dataset. Second, a variable from the birth record that reflects the number of children ever born was used to maintain only those records that indicated this was the first child.

Entry into care. Entry into care is a dichotomous variable (*yes, no*) that is operationalized according to whether or not there was a placement in foster care lasting at least eight days. Among those girls who did not enter foster care but had a substantiated maltreatment allegation, some would have received a range of home-based services with the goal of family preservation. Others might have been placed into emergency care for a brief period followed by a return to their families when the crisis was resolved. Still other might have ended their involvement with the child welfare system with the investigation and would not have received any services or additional monitoring.

Race/Ethnicity. Race/ethnicity is a categorical variable based on the primary race/ethnicity type identified in CWS/CMS and collapsed into five groups (*Latino, White, Black, Asian/Pacific Islander, and Native American*). Latino includes those listed as Hispanic, Mexican, South American, Caribbean, Central American (Hispanic), or those for whom Hispanic origin is indicated (regardless of any other categorization). White includes those listed as White, Armenian, European, Middle Eastern, or Romanian. Black includes those listed as either Black or Ethiopian. Asian/Pacific Islander includes Asian Indian, Cambodian, Chinese, Filipino, Guamanian, Hawaiian, Japanese, Korean, Laotian, Hmong, Polynesian, Samoan, Vietnamese, Other Asian, and Other Pacific Islander. Native American includes those listed as either American Indian or Alaskan Native.

Recurrence of substantiated maltreatment. Recurrence is a dichotomous variable (*yes, no*) that is operationalized according to whether or not there was another substantiated allegation of maltreatment at any point after the initial substantiation. Additional substantiated allegations dated the day after the initial report or with an associated identifier that referred to the initial report were not coded as recurrence. Again, the first known instance of substantiated maltreatment occurred after girls' 10^{th} birthday and prior to the estimated date of conception (among those who gave birth). Rates of recurrence may have been affected by placement in foster care, as being in care may reduce exposure to further incidents of maltreatment. Because of this potential problem, additional analyses were conducted to assess whether or not the

inclusion of the variable biased the relationship between foster care placement and giving birth as an adolescent.

Multi-type maltreatment. Multi-type maltreatment was a dichotomous variable (*yes, no*) that was operationalized according to whether or not there was more than one type of substantiated maltreatment (e.g. sexual abuse and neglect vs. sexual abuse alone).

Maltreatment type. Maltreatment type was collapsed into the following five categories: sexual abuse (includes sexual abuse and exploitation), physical abuse, neglect (includes severe neglect, general neglect, caretaker absence/incapacity), emotional abuse, and risk of abuse (includes substantial risk and sibling was abused). Substantial risk was selected when child protective investigators believe that although the child in question had not been maltreated, there was evidence of substantial risk of maltreatment (this category was removed from CWS/CMS in 2011). Rather than creating a mutually exclusive categorical variable, maltreatment type is coded into five dichotomous variables (*yes, no*) that indicate whether or not each girl ever experienced each category of maltreatment (sexual abuse, physical abuse, neglect, emotional abuse, and risk of abuse).

Date of conception. As was the case for the first question, the date of conception was a critical variable that set boundaries around the timing of events. The date of conception was estimated using the average gestational age (273.9 days) for all adolescent births in California and was used as a cutoff date for determining whether or not there was an entry into foster care, recurrence of maltreatment, or multi-type maltreatment, as well as if there was a substantiated allegation for each type of maltreatment. For example, if a girl who gave birth experienced a foster placement, but her first date of entry into care was after she got pregnant, she was coded as not having an entry into care. Similarly, if she had a substantiated allegation of physical abuse, but the first substantiated allegation occurred after she conceived, she was coded as not experiencing physical abuse.

Data Analysis

Analysis 1

What is the prevalence of early childbirth among adolescent girls in foster care in California?

Birth rate calculations. To establish the prevalence of births to adolescent girls in foster care, a birth rate was calculated that could be compared to the teen birth rate in the general population. Birth rates for the general population are computed by taking a ratio of the number of live births per year to the number of women of childbearing age in the population (for the U.S., the general birth rate is calculated among women aged 15–44; Martin et al., 2013). Typically, these ratios are multiplied by 1,000 to generate a birth rate per 1,000 in the population. For this analysis, birth rates were calculated per 100 rather than per 1,000 given both the size of the base population in foster care and the number of births per year. Comparing rates per 1,000 may also have the unintended effect of making differences between a foster care birth rate and a general population birth rate appear larger than they actually are (e.g. two rates per 1,000 of 34.7 and 41.8 vs. two rates per 100 of 3.5 and 4.2).

For annual (2006-2010) teen birth rates among girls in foster care, a base population denominator was specified that included all girls 15–17 years of age who were in an active foster care placement for at least 8 days at some point during each year. The numerator included all girls (ages 15–17) in foster care during each year who gave birth during that same year. This numerator consisted of three groups: (1) girls who gave birth during the year and were in foster care at the time of birth; (2) girls who gave birth during the year and after exiting foster care; and (3) girls who gave birth during the year and before entering care.

The general population teen birth rate was calculated based on a numerator derived from vital statistics records for mothers who were 15 to 17 years of age at the time of birth. A denominator reflecting the annual counts of 15- to 17-year-old girls in the state was estimated from data available from the California Department of Finance. Estimates of state birth rates calculated for this study may differ slightly from other published rates. Differences arise because denominators for birth rates published by the California Department of Public Health (2010) were generated from population data available in 2010, while this study used revised intercensal population estimates released in 2012 (California Department of Finance, 2012).

Birth rates for both the general population and the foster care population were also stratified by race/ethnicity. Racial/ethnic disparities were calculated using the Disparity Index (Shaw, Putnam-Hornstein, Magruder, & Needell, 2008), which takes a ratio of the rates for two groups (i.e. Black vs. White). In addition, rates were generated across a number of foster care placement experiences, including: episode length; placement stability; number of episodes in foster care; placement type; and removal reason (reason for entry into foster care).

Birth rate trends. To assess birth rate trends between 2006 and 2010, the Cochran–Armitage trend test was used, which is a Chi-square test for trends in proportions (Agresti, 2002; Armitage, 1955). This test is designated for contingency tables with ordered rows and partitions the Chi-square into two parts. The first part assesses for linearity using a model fitted by ordinary least squares, while the second part tests for "goodness of fit" or departure from the linear trend. This test was conducted using the PTREND Stata module (Royston, 2002). Numerator (births) and denominator (population) counts for each year were organized into contingency tables for each variable (e.g. general population, foster care, Latinas, girls in foster care for 12 months or less, etc.). For each table, the PTREND command returns a χ^2 statistic and *p*-value for the trend and a χ^2 statistic and *p*-value for departure from linearity. For birth rates in which a significant trend is observed, the *p*-value is reported. When that trend can be accurately described as linear (i.e. there is little significant departure from linearity), the *p*-value is also reported.

Analysis 2

Is a history of foster care placement associated with higher rates of early childbirth among maltreated adolescents in California?

Descriptive statistics. Descriptive characteristics of the study population are reported. The distribution of covariates (foster care placement status, race/ethnicity, and maltreatment experiences) is reported for the full cohort and for those who gave birth for the first time as an adolescent. Chi square tests were performed to assess differences between those who had a first birth and those who did not across these characteristics. Cumulative rates of first births per 100 were generated for the full cohort and for subgroups based on these covariates.

Hazard models. As previously described, the study population was limited to adolescent girls who experienced a first known substantiated allegation of maltreatment after their 10th birthday and prior to conception for those girls who gave birth. Additionally, data for births to girls born in 1992 and 1993 are incomplete through age 19 because vital birth records were only available through 2010. As a result, consistent child welfare exposure data is only available between age 10 and 17 for the birth cohorts (1989-1993) in the study and the full count of first births as girls get older (when births are more common among adolescents) is unavailable. Even with consistent windows of CWS exposure, the timing of the first allegation and the first entry into foster care is varied. These variations, including age at first birth, are depicted in Table 3. The mean age for a first substantiated allegation was 13 and the mean age at entry into foster care was just over that (13.5). On the other hand, the mean age for giving birth for the first time as an adolescent in this population was 17.3 and few births occurred prior to age 15.

The period of time any girl may be considered "at risk" of a first birth varied given the differences in age with respect to entry into foster care and a first birth. Additionally, births are right-censored for the youngest of the girls in the study. As such, hazard models were used to determine the association between foster care placement and a first birth as an adolescent. The general form of a Cox hazard model formula is:

$$h(t, X) = h_0(t)\exp\sum_{i=1}^{p} \beta_i X_i$$

This expression states that the hazard at time *t* for an individual with given set of a explanatory covariates denoted by *X* (also called a "vector" of covariates) is a product of the baseline hazard, $h_0(t)$, and the exponential of sum of $\beta_i X_i$ (Kleinbaum & Klein, 2005). This model is based on the assumption that the hazards are proportional and that the covariates are time-independent. It cannot be assumed, however, that the risk for a girl who enters foster care at age 13 and has her first child at age 18 is proportional to the risk for another girl who enters foster care at age 15 and has her first child at age 16. Girls' exposure status can change within the window of time at risk, which is between when they experience a first substantiated allegation of maltreatment and when they experience the outcome of interest (a first birth as an adolescent) or are censored (at their 20th birthday or the end of the study window). Because the nature of this exposure was inherently time dependent, an extension of the Cox proportional hazards model was specified (Fisher & Lin, 1999; Kleinbaum & Klein, 2005). The extended Cox model is given by:

$$h\big(t, X(t)\big) = h_0(t)\exp\left[\sum_{i=1}^{p_1} \beta_i X_i\right] + \left[\sum_{j=1}^{p2} \delta_j X_j(t)\right]$$

In this model, the exponential component of the multiplicative expression contains both time-independent variables denoted by X_i and time-dependent variables denoted by X_j. For the purposes of assessing the time-varying relationship between foster care placement and giving birth as an adolescent, both unadjusted and adjusted Extended Cox Models were specified. The unadjusted model, which is the hazard of a first birth at time *t* depending on whether or not there was an entry into foster care, is given by:

$$h\big(t, X(t)\big) = h_0(t)\exp[\delta \text{foster care}(t)]$$

Where:

$$\text{foster care} = \begin{cases} 1 \text{ if entry to foster care} \\ 0 \text{ if no entry into foster care} \end{cases}$$

In both the unadjusted and the adjusted models, girls belonged to the overall set of those who had not been placed into foster care (foster care=0) until the day they experienced an entry into foster care (foster care=1).

The adjusted model estimates the hazard of a first birth at time *t* while adjusting for race/ethnicity and whether or not the following characteristics of maltreatment were experienced: recurrence of maltreatment, multi-type maltreatment, sexual abuse, physical abuse, neglect, emotional abuse, and risk of abuse. This model is given by:

$$h\big(t, X(t)\big) = h_0(t)\exp[\delta_1 \text{foster care}(t)$$
$$+ \beta_1 \text{Latina} + \beta_2 \text{Black} + \beta_3 \text{Asian/PI} + \beta_4 \text{Native American} + \beta_5 \text{recurrence} + \beta_6 \text{multi-type maltreatment}$$
$$+ \beta_7 \text{sexual abuse} + \beta_8 \text{physical abuse} + \beta_9 \text{neglect} + \beta_{10} \text{emotional abuse} + \beta_{11} \text{risk for abuse }]$$

In order to set up the data as survival-time data and code for the time-dependent nature of foster care placement, a number of steps were taken. First, an observation window was generated that was censored at the minimum of either the age as of the last possible date of observation (December 31, 2010) or the day before the 20th birthday. Second, a window for the outcome (or failure, in survival analysis terms) was generated from the minimum of either the age at first birth or the overall observation window if there was no birth during adolescence. Third, a similar window for the time-dependent exposure was generated, which was the minimum of either the age at first entry into foster care, the age at first birth if there was a birth, or the overall observation window if there was no birth and no entry into foster care. Fourth, the stset command in Stata was used to declare that these data were time-survival data based on the variables generated in the previous steps (StataCorp, 2009). Lastly, to include entry into foster care as a time-varying covariate, the Stata command stsplit was used, which created separate time spans for each observation in which there was an entry into foster care. In those cases, the first row of data represented the period of time prior to foster care entry and the second row represented the period of time following foster care entry, thus generating unique values for the time from entry into care and a first birth (among those girls that gave birth).

Stratified hazard models. Given the well-documented racial/ethnic disparities in adolescent birth rates and child welfare service involvement, stratified hazard models for the three largest racial/ethnic groups in California were specified. Both unadjusted and adjusted estimates of the hazard of a first birth depending on whether or not there an entry into foster care were generated for Latina, White, and Black adolescents with substantiated allegations of maltreatment.

Protection of Human Subjects

This study does not involve any direct contact or interaction with human subjects. It is a secondary analysis of existing administrative data, which is collected for non-research purposes. However, because the study used confidential identifiers (and therefore private information) to link vital birth and child welfare service records, Committee for the Protection of Human Subjects (CPHS) approval from the University of California, Berkeley (UCB) and the California Health and Human Services Agency was necessary. The larger study under which this dissertation study was conducted had existing approved CPHS protocols (UCB # 2010-01-592 and Health and Human Services Agency # 12-10-0800) through the California Child Welfare Indicators Project (CCWIP). Those approvals were inclusive of the data linkages and analyses conducted for this study. They also detail the protocols for ensuring the security of data housed in the data center at CCWIP.

Data Security Protocol

There is an extensive data security protocol for CCWIP, which ensures that confidential information is protected and secure. CWS/CMS data (without confidential identifiers) are hosted on CCWIP's secure server, which is accessible only to approved users. Encrypted connections are allowed, provided the user has an account, a password of adequate strength and complexity, and a conforming client application. The server complies with the University of California's *Minimum Security Standards for Networked Devices*: https://security.berkeley.edu/mssnd. CWS/CMS data containing confidential identifiers are considered restricted and are stored on a secure computer system, which is connected to a private network and located in and limited to a separately keyed and alarmed office in the CCWIP data center.

Data sets obtained from the California Department of Public Health are uploaded and stored on the secure computer system. Security protocols required by the Vital Statistics Advisory Committee (VSAC) for receipt of Vital Records with confidential identifiers are followed. Once vital birth records were linked to child welfare records and stripped of all names, social security numbers, and addresses, these data were uploaded to CCWIP's secure server.

CHAPTER 4: RESULTS

This chapter details the results of the two analyses. It is organized into two major sections. The first presents the results of the first analysis, which was a cross-sectional examination of births to girls in foster care. The second focuses on the results of the second analysis, which was a prospective analysis of first births among a cohort of maltreated girls with involvement in child welfare services. Each section concludes with a summary of these results, which will be discussed in greater detail in chapter 5.

Analysis 1

What is the prevalence of early childbirth among adolescent girls in foster care in California?

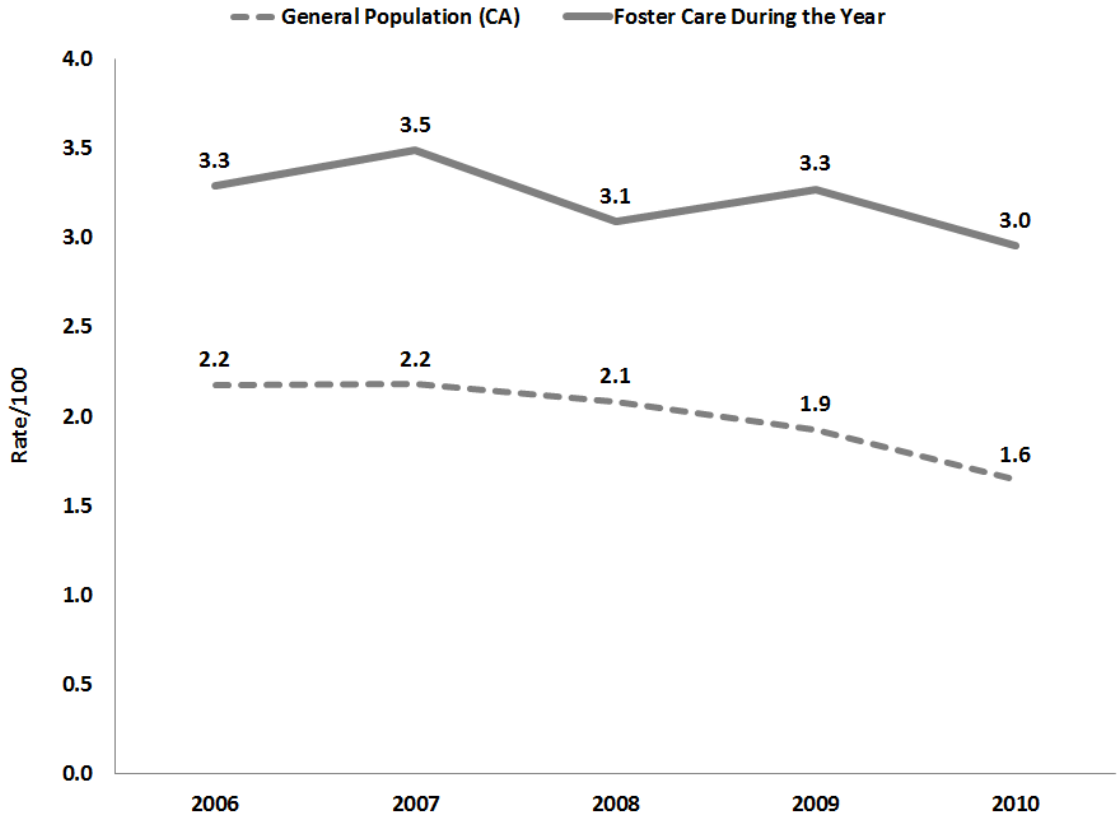
The goal of this first analysis was to establish the prevalence of early childbirth among girls in foster care. Specifically, annual (2006-2010) birth rates were calculated among female adolescents (aged 15–17) in foster care during the same year they gave birth. These rates were compared to statewide birth rates for similarly aged girls in the general population. Birth rates were also examined by race/ethnicity to determine whether differences between the foster care and general population vary by racial/ethnic group and whether disparities observed in the general population are consistent for the foster care population. Among girls in foster care, birth rates across characteristic foster care experiences were also computed. And lastly, the status of foster care placement was determined at the birth and at the estimated date of conception to assess whether or not girls were in foster care when they gave birth and when they got pregnant.

General Population vs. Foster Care Birth Rates

Figure 2 presents annual teen birth rates (per 100) for 15- to 17-year-olds between 2006 and 2010. These birth rates were computed for (1) girls in the general population of California and (2) girls who were in foster care at some point during each year (also detailed in Table 3). On average, girls in foster care gave birth at moderately higher (60%) rates than adolescent girls in the general population (3.2 per 100 vs. 2.0 per 100).

Across the 5 years of data examined, general population teen birth rates declined consistently and significantly by nearly 24.4%, from 2.2 per 100 in 2006 to 1.6 in 2010 ($p < .001$; this trend was also linear at $p < .001$). Birth rates among girls in foster care declined more modestly by about 10.2% over the same time period (3.3 per 100 in 2006 to 3.0 in 2010) after a peak 2007. At the peak in 2007, of the 13,325 15- to 17-year-old girls in foster care during the year, 406 gave birth during the same year they were in foster care. And in 2010, when birth rates among girls in foster care were at their lowest, only 317 out of 10,737 gave birth. There was no visual or statistical evidence of a trend for this decline. The difference in the pace of decline between births to girls in the general population compared to girls in foster care contributed to wider gaps in birth rates by the end of the study period. Indeed, by 2010, adolescent girls in foster care were nearly twice as likely to give birth as girls in the general population.

Figure 2: Foster Care vs. General Population Birth Rates in California



Race/Ethnicity and Adolescent Birth Rates

Table 4 presents the number of births and rates per 100 among girls in the general population, in foster care, and across the three largest racial/ethnic groups. Of all of the groups and across all years, Latina adolescents were most likely to give birth. Birth rates declined significantly for Latina ($p < .001$, trend was linear at $p < .001$), Black ($p < .001$, trend was linear at p=.02), and White ($p < .001$) adolescent girls in the general population, while a similar trend was only observed among Latinas in the foster care population (p <=.02).

Compared to Latina adolescents in the general population, those in foster care were 23% more likely to give birth. On average, Latina adolescents in foster care gave birth at a rate of 4.3 per 100, while Latinas in the general population had a birth rate of 3.5 per 100. Births rates to Black adolescent girls were similar: those in foster care were 31% more likely to give birth than those in the general population. Among White adolescent girls, there were notable differences between those in foster care and those in the general population. Over the 5-year study period, birth rates to White adolescents in foster care averaged 2.0 per 100 while birth rates to White adolescents in the general population averaged less than 1 per 100. This difference meant that White foster youth were more than three times as likely to give birth as White teenagers in the general population.

Table 1: Birth Rates for the General Population vs. Foster Care Population by Race/Ethnicity: Average Birth Rate 2006-2010 and Birth Rates by Year

	2006-2010	2006		2007		2008		2009		2010	
	Average Rate	Births	Rate	Births	Rate	Births	Rate	Births	Rate	Births	Rate
	per 100	*n*	*per 100*	*n*	*per 100*	*n*	*per 100*	*n*	*per 100*	*n*	*per 100*
General Population (CA)**	**2.0**	17,242	2.2	17,595	2.2	17,025	2.1	15,436	1.9	13,318	1.6
Latina**	**3.5**	13,208	3.8	13,673	3.7	13,365	3.5	12,011	3.1	10,425	3.5
Black**	**2.3**	1,376	2.4	1,367	2.4	1,333	2.3	1,262	2.3	1,021	1.9
White*	**0.6**	1,872	0.7	1,800	0.7	1,613	0.6	1,488	0.6	1,297	0.5
Foster Care Population	**3.2**	453	3.3	465	3.5	395	3.1	386	3.3	317	3.0
Latina*	**4.3**	226	4.5	252	5.0	209	4.2	200	4.1	174	3.8
Black	**3.0**	133	3.1	129	3.1	113	2.9	110	3.2	82	2.6
White	**2.0**	79	2.1	73	2.0	61	1.8	58	2.0	49	1.9

Notes. Denominator for each year is the count of female youth in foster care during the year: 2006=13,777; 2007=13,325; 2008=12,768, 2009=11,795; 2010=10,737.
*trend is significant at $p<.05$; **trend is linear at $p<.05$

Latina teenage girls also had substantially higher birth rates than their Black and White counterparts whether they were in foster care or the general population. Black adolescents were consistently more likely to give birth than White adolescents, regardless of whether or not they were in foster care. Disparities across race, particularly when comparing Latina and Black adolescents to White adolescents, varied between those in foster care and those in the general population. Among adolescent girls in the general population, Latinas were 5.5 times and Black adolescents were 3.6 times as likely to give birth as White adolescents. On the other hand, among those in the foster care population, these disparities were substantially diminished. Latina and Black adolescents in foster care were 2.2 times and 1.5 times (respectively) as likely to give birth as White adolescents in foster care.

Experiences in Foster Care

Notable differences in teen birth rates of foster youth across placement-related experiences also emerged, which are presented in Table 5. Birth rates were higher among those in care for the shortest amount of time and a graded relationship between episode length and birth rate was observed, with rates of birth declining as the length of stay increased. The birth rate for those in care for less than 12 months was approximately 73% higher than the rate for those in care for 60 months or more. This was despite the fact that being in care for at least five years was the most common experience in this population. Birth rates for those who were in care between one and five years were substantially lower than for those in care for less than one year, but still moderately higher than for those in care for the longest time. There were no observed trends over the five-year period with respect to episode length.

Placement stability was also related to the likelihood of giving birth: girls who experienced the least amount of stability (9 or more placements) had substantially higher birth rates than those who experienced greater stability. Birth rates were lowest for those who had three to four placements during the focal episode. Additionally, birth rates for this group declined significantly (p=0.03) between 2006 and 2010. Birth rate differences by episode count were less striking. On average, the annual birth rate to girls in a repeat episode (second or subsequent episode) of care was moderately higher than those in their first episode (3.6 vs. 3.0 per 100, respectively).

For the population of girls placed in foster care during the calendar year in which they gave birth, birth rates were also stratified by placement type. The lowest birth rates were consistently observed among girls placed in guardian homes and other placements. Overall, girls placed in these settings were far less likely to give birth than girls in other placements and the birth rate for this population of girls declined significantly over the five-year period (p = .03). Across the other three placement types, kin homes had the next lowest birth rates, although the average rate of birth for this group was markedly higher than the average rate for girls in guardian homes and other placements (1.4 vs. 3.3. per 100). In general, births in congregate care were slightly more frequent than births in kinship care; births to girls placed in congregate care peaked in 2007 but declined significantly and substantially over the study period (3.7 per 100 in 2006 to 2.9 in 2010, p = .04). The highest birth rates tended to occur among girls in non-relative foster homes, particularly between 2008 and 2010.

Table 1: Birth Rates by Placement-Related Experiences among Females Age 15-17 in Foster Care: Average Birth Rate 2006-2010 and Birth Rates by Year

	2006-2010	2006		2007		2008		2009		2010	
	Avg. Rate/100	Births	Rate/100	Births	Rate/100	Births	Rate/100	Births	Rate/100	Births	Rate/100
Foster Care During the Year	**3.2**	453	3.3	465	3.5	395	3.1	386	3.3	317	3.0
Episode Length											
<12 months	**3.5**	108	3.1	141	4.2	123	3.7	94	3.1	103	3.6
12-23 months	**2.4**	62	3.0	46	2.2	48	2.4	51	2.6	36	2.0
24-59 months	**2.4**	82	2.7	74	2.4	68	2.2	69	2.4	59	2.3
60 + months	**2.0**	108	2.1	101	2.2	78	1.8	88	2.3	60	1.8
Placement Stability											
1-2 placements	**2.3**	118	2.0	150	2.7	123	2.3	105	2.2	103	2.3
3-4 placements*	**2.2**	77	2.6	66	2.3	66	2.4	49	1.9	39	1.7
5-8 placements	**2.5**	79	2.8	69	2.6	59	2.3	66	2.7	45	2.1
9+ placements	**3.9**	86	4.3	77	3.8	69	3.4	82	4.3	71	4.0
Episodes in Foster Care											
First episode	**3.0**	253	2.9	285	3.4	243	3.0	220	3.0	194	2.9
Second episode or higher	**3.6**	200	4.0	180	3.7	152	3.2	166	3.8	123	3.1
Placement Type											
Kin/relative home	**3.3**	137	3.6	126	3.5	99	3.0	88	3.0	75	2.9
Non-Relative home	**3.9**	175	3.5	193	3.9	182	3.6	220	4.5	166	3.7
Congregate care*	**3.6**	98	3.7	110	4.5	81	3.7	58	3.1	53	2.9
Guardianship/other*	**1.4**	43	1.8	36	1.5	33	1.4	20	0.9	23	1.2
Removal Reason											
Sexual abuse	**2.8**	28	2.6	24	2.4	32	3.5	17	2.0	27	3.6
Physical abuse	**2.8**	42	2.4	51	3.2	38	2.6	41	3.0	33	2.7
Neglect	**3.4**	344	3.5	357	3.7	295	3.2	311	3.6	236	3.0

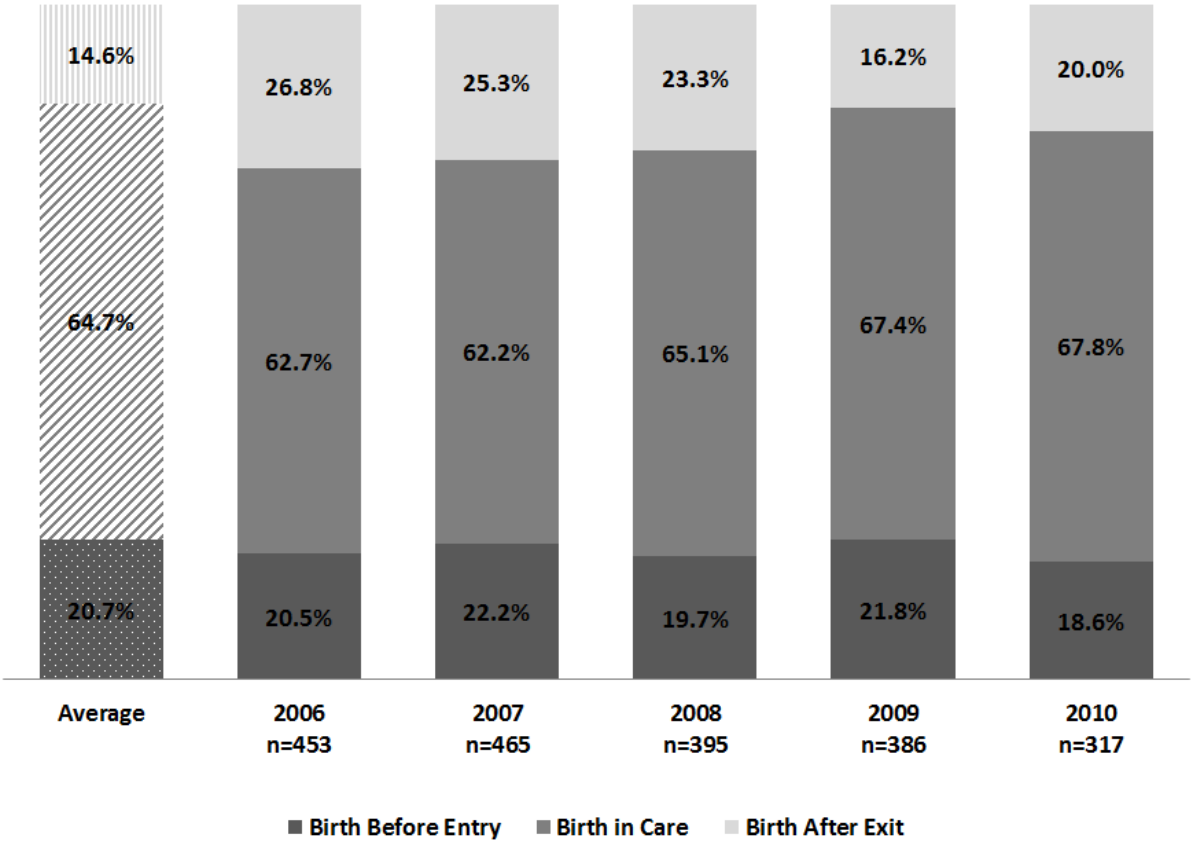
Notes. Each covariate rate is computed for the focal episode and the denominator is the corresponding characteristics of all female youth in care during the year. Episode Length and Placement Stability variables not calculated for female youth entering care after giving birth.
*trend is significant at $p<.05$; **trend is linear at $p<.05$

Lastly, differences in birth rates across removal reason were inconsistent between 2006 and 2010, with the highest rates alternating between girls removed for sexual abuse and girls removed for neglect. On average, however, those removed for neglect had higher birth rates than those removed for sexual or physical abuse.

Timing of Births to Girls in Foster Care

Among girls in foster care who gave birth during the same year they were in care, births could have occurred before, during, or after the foster care placement. Figure 3 presents the average and annual percentages of 15–17 year olds who gave birth during an active foster care episode, after exiting foster care, or prior to entering foster care. The distribution of these three groups varied by year and there were no detectable trends across the five years of the study period. On average, a majority (64.7%) of girls in foster care who gave birth during the same year they were in care did so during an active foster care episode. Among the remaining girls who gave birth the same year they were in care, an average of 20.7% gave birth before entering care and 14.6% gave birth after exiting from care.

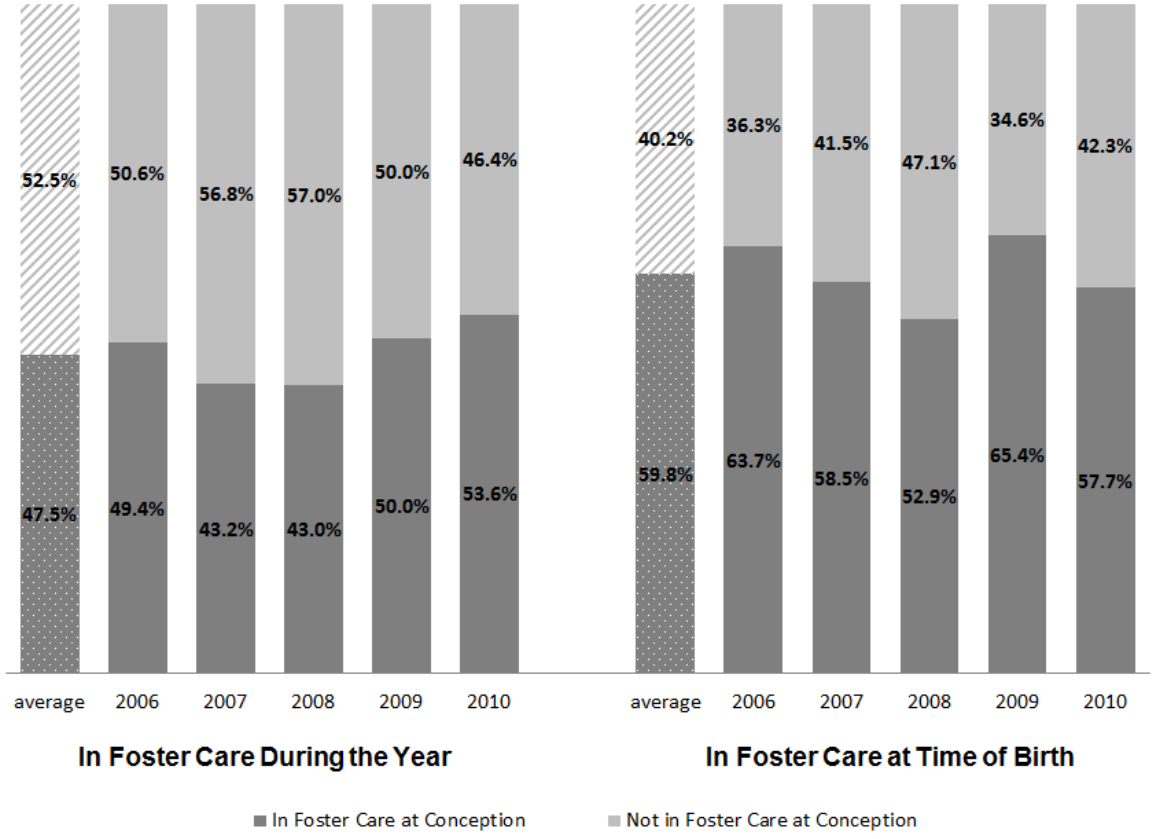
Figure 3: Timing of Births to Girls in Foster Care: Before Entry, In Care, and After Exit



Foster Care Placement Status at Conception

Just as the timing of births and foster care placement varied, so too did the relationship between the estimated date of conception and foster care placement. Figure 4 presents the percentage of girls in an active foster care placement at the estimated date of conception by year. Although foster care status at conception shifted over time, there were no significant trends during the study period. On average, among girls in foster care at any point during the same year in which they gave birth, slightly more than half became pregnant before entering or reentering care (vs. 47.5% who were in care at the estimated date of conception). Among girls who gave birth while in foster care, the proportion that conceived during an active foster care placement was higher (59.8%).

Figure 4: Foster Care Placement Status at Conception: In Care during the Year vs. In Care at Birth



Summary

In sum, the findings from this analysis document that birth rates among 15- to 17-year-old girls in foster care are indeed higher than birth rates among similarly aged girls in the general population. And while birth rates to teenagers in the general population are steadily declining, there is no evidence of a similar decrease among the foster care population, which has widened the disparity between these groups. The rate of childbirth among teens in foster care varies across

a range of factors, including race/ethnicity, episode length, placement stability, placement type, and maltreatment removal reason. Both Black and Latina girls in foster care were consistently more likely to give birth than their White counterparts but these racial differences were diminished relative to those observed in the overall teen population. Across placement-related covariates, shorter stays in care and greater placement instability were associated with the highest birth rates in the foster care population.

Analysis 2

Is a history of foster care placement associated with higher rates of early childbirth among maltreated adolescents in California?

This second analysis assessed the incidence of a first birth among a cohort of girls with substantiated allegations of maltreatment in California and identified whether or not the birth rate was higher among those who entered foster care. More specifically, this analysis sought to determine whether girls who were substantiated for maltreatment and placed in foster care had a higher rate of a first birth as an adolescent when compared with girls who experienced substantiated maltreatment but never entered foster care. Additional questions focused on how the relationship between placement in foster care and early childbirth varied by race/ethnicity and different experiences of maltreatment, including recurrence, multi-type maltreatment, and maltreatment type.

Descriptive Statistics

Study Population. There were 81,167 girls in California who experienced a first known substantiated allegation of maltreatment after their 10th birthday and before the estimated date of conception (for those that gave birth). Table 6 presents the characteristics of the full population of girls in the study, those who had a first birth, and the results of Chi square testing across these covariates. Nearly 1 in 4 of these girls spent time in foster care. Generally, girls were younger at the first known substantiated allegation of maltreatment, with girls who were between the ages of 10 and 13 (30%) and 12 and 13 (29%) constituting the largest groups. In terms of race/ethnicity, the majority of the population was Latina (48%), followed by White (28%), and Black (14%). With respect to maltreatment exposures, about 1 in 5 girls experienced recurrent maltreatment and just under a third experienced more than one type of maltreatment. Nearly half the population had a substantiated allegation of neglect, while 22% of girls experienced sexual abuse and nearly 20% experienced physical abuse.

Girls who gave birth. In this cohort of maltreated girls who had a first known substantiated allegation of maltreatment after their 10th birthday, almost 18% (14,364) gave birth for the first time when they were between the ages of 12 and 19.[2] Among girls who gave birth, 27% spent time in foster care. As in the full population, girls who gave birth tended to experience a first known substantiated allegation of maltreatment during pre-adolescence and early adolescence. A substantial majority of those who gave birth were Latina (61.3%), a proportion that exceeds their representation in the full population. Girls who experienced

[2] Of the 14,364 girls who had a first birth, almost 18% (2,551) had a subsequent birth before 2011. There was no significant difference in the rate of a second birth between those who were placed in foster care versus those who remained at home.

recurrence, multi-type maltreatment, sexual abuse, physical abuse, and neglect were somewhat overrepresented among those who gave birth (compared to their representation in the study population). The differences between those who gave birth and those who didn't were statistically significant across all covariates.

Table 6: Girls with Substantiated Maltreatment Allegations after Age 10: Variable Distribution, First Births, and Chi-Square Test Results

	All		Births		χ^2
	N	Col%	N	Col%	p-value
Total	81,167	--	14,364	--	--
Placement in Foster Care					
Placed in Foster care	19,862	24.5	3,879	27.0	<.001
Remained at home	61,305	75.5	10,485	73.0	
Age at First Substantiated Allegation					
10-11	24,364	30.0	4,260	29.7	
12-13	23,366	28.8	4,639	32.3	<.001
14-15	20,476	25.2	3,880	27.0	
16-17	12,691	15.6	1,585	11.0	
Race/Ethnicity					
Latina	39,321	48.4	8,800	61.3	
White	23,006	28.3	2,789	19.4	
Black	11,203	13.8	2,019	14.1	<.001
Asian/Pacific Islander	3,735	4.6	310	2.2	
Native American	612	0.8	117	0.8	
Recurrence of Maltreatment					
Recurrence	17,390	21.4	3,767	26.2	<.001
Single event	63,777	78.6	10,597	73.8	
Complex Maltreatment					
Multiple maltreatment types	24,494	30.2	5,011	34.9	<.001
Single maltreatment type	56,673	69.8	9,353	65.1	
Sexual abuse					
Yes	17,424	21.5	3,375	23.5	<.001
No	63,743	78.5	10,989	76.5	
Physical abuse					
Yes	15,779	19.4	3,244	22.6	<.001
No	65,388	80.6	11,120	77.4	
Neglect					
Yes	39,465	48.6	7,248	50.5	<.001
No	41,702	51.4	7,116	49.5	
Emotional abuse					
Yes	15,368	18.9	2,484	17.3	<.001
No	65,799	81.1	11,880	82.7	
Risk of abuse					
Yes	18,862	23.2	3,224	22.4	0.013
No	62,305	76.8	11,140	77.6	

Remaining at home versus entering foster care. Differences between girls who entered care and girls who remained at home are presented in Table 7. The distribution across covariates indicates that girls who entered foster care differed on a number of characteristics from those

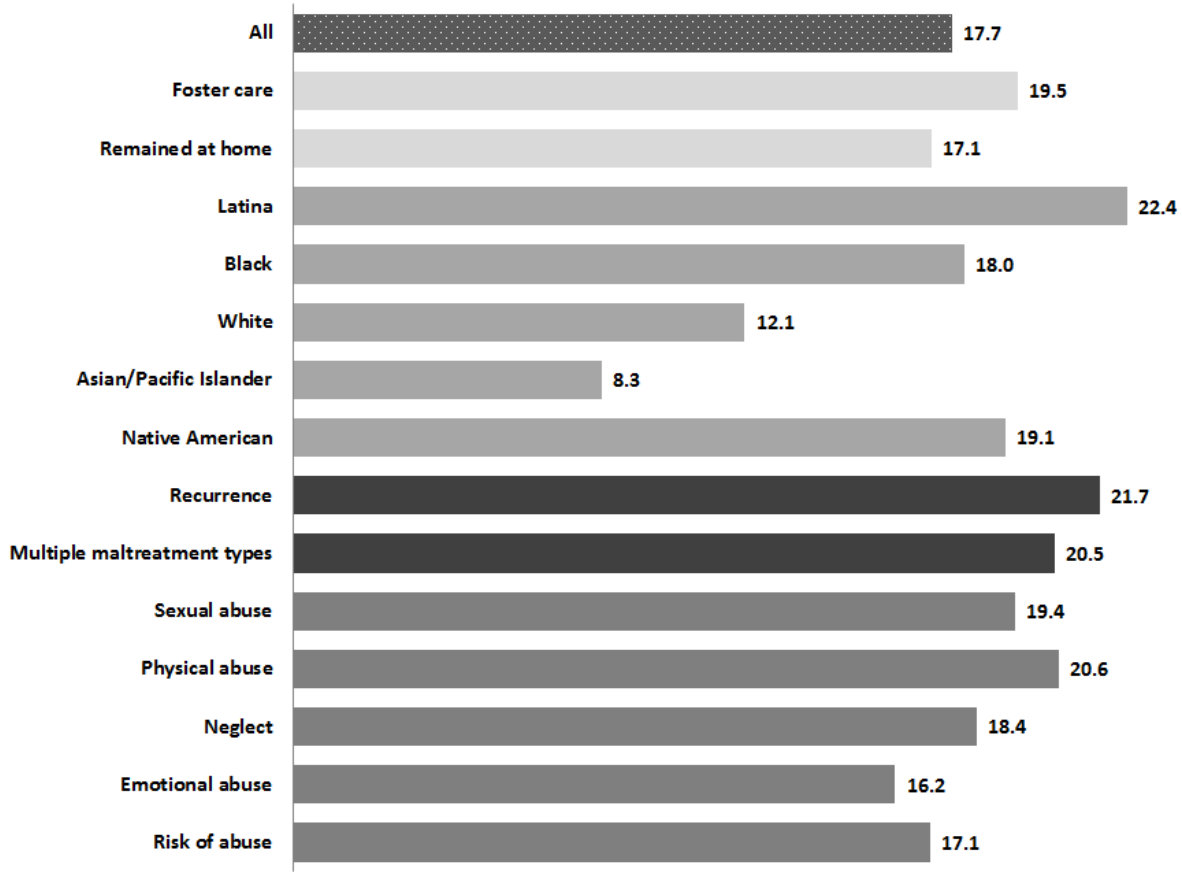
who remained at home, which justifies the inclusion of these variables in the multivariable hazard analysis. There differences were statistically significant across all covariates. In terms of age, girls who had substantiated allegations of maltreatment between the ages of 10 and 11 had the highest rate of entry into care. Similarly, Black and Native American girls had higher entry rates than other racial/ethnic groups and were disproportionately represented among girls who entered care. Girls who experienced recurrent and multi-type maltreatment were more likely to enter foster care compared to those that did not. With respect to maltreatment type, entry rates for girls who experienced neglect (37.7 per 100) and physical abuse (31 per 100) were far higher than the average entry rate. On the other hand, those who experienced sexual abuse had somewhat lower rates than those who did not.

Table 7: Remaining at Home vs. Entry to Foster Care among Girls with Substantiated Maltreatment Allegations after Age 10: Variable Distribution, Chi-Square Test Results, and Entry Rates

	Remained at Home		Entered Foster Care		χ^2	Entry Rate
	N	%	N	%	p-value	per 100
Total	61,305	75.5	19,862	24.5	--	24.5
Age at First Substantiated Allegation						
10-11	17,801	29.0	6,563	33.0	<.001	26.9
12-13	17,765	29.0	4,639	23.4		19.9
14-15	15,517	25.3	3,880	19.5		18.9
16-17	10,222	16.7	1,585	8.0		12.5
Race/Ethnicity						
Latina	30,356	49.5	8,965	45.1	<.001	22.8
White	17,231	28.1	5,775	29.1		25.1
Black	7,098	11.6	4,105	20.7		36.6
Asian/Pacific Islander	2,988	4.9	747	3.8		20.0
Native American	415	0.7	197	1.0		32.2
Recurrence of Maltreatment						
Recurrence	9,041	14.7	8,349	42.0	<.001	48.0
Single event	52,264	85.3	11,513	58.0		18.1
Complex Maltreatment						
Multiple maltreatment types	8,369	13.7	11,493	57.9	<.001	46.9
Single maltreatment type	48,304	78.8	13,001	65.5		22.9
Sexual abuse						
Yes	13,454	21.9	3,970	20.0	<.001	22.8
No	47,851	78.1	15,892	80.0		24.9
Physical abuse						
Yes	10,893	17.8	4,886	24.6	<.001	31.0
No	50,412	82.2	14,976	75.4		22.9
Neglect						
Yes	24,596	40.1	14,869	74.9	<.001	37.7
No	36,709	59.9	4,993	25.1		12.0
Emotional abuse						
Yes	11,687	19.1	3,681	18.5	<.001	24.0
No	49,618	80.9	16,181	81.5		24.6
Risk of abuse						
Yes	14,016	22.9	4,846	24.4	0.013	25.7
No	47,289	77.1	15,016	75.6		24.1

Rates of first birth. Figure 5 presents cumulative birth rates across these same covariates. For the entire cohort of girls who had a first substantiated allegation of maltreatment after their 10th birthday, the birth rate was 17.7 per 100. A higher birth rate was observed for those girls who spent time in foster care compared to those who remained at home (19.5 vs. 17.1 per 100). Across all covariates, Latinas also had the highest birth rate, followed by Native American, Black, and White adolescents. Asian/Pacific Islander adolescents had the lowest birth rate at 8.3 per 100. Those who experienced recurrent substantiated maltreatment had higher rates of birth compared to those who only had one episode of substantiated abuse or neglect (21.7 vs. 16.6 per 100). A similar pattern was observed for those who experienced more than one type of substantiated maltreatment. Higher birth rates are evident among those girls who experienced substantiated sexual abuse, physical abuse, and neglect compared to those who did not. On the other hand, those who had substantiated allegations of emotional abuse or risk of abuse had somewhat lower rates of birth compared to those who did not.

Figure 5: First Births among Maltreated Girls: Cumulative Rates per 100



Hazard Models

Unadjusted and adjusted models. Table 8 reports the estimates of an unadjusted model and a model that adjusts for race/ethnicity and maltreatment-related covariates. The unadjusted model indicates that among maltreated girls, birth rates were 25% higher for those who entered

foster care compared to those who remained at home. After adjusting for other covariates, even this small difference was reduced. Girls who were in foster care gave birth at a rate that was 12% higher than those who remained at home. When adjusting for foster care placement and other covariates, birth rates to Latinas were more than twice as high as birth rates to White adolescents. Black and Native American adolescents also had higher rates of a first birth compared to White adolescents (54% and 67% higher, respectively), but Asian/Pacific Islander adolescents had lower rates (26% lower).

Table 8: Unadjusted and Adjusted Extended Cox Models: First Births to Maltreated Girls

	First Birth	
	HR	**95% CI**
Unadjusted Model		
Foster care placement vs. remaining at home	1.25***	(1.20, 1.30)
Adjusted Model		
Foster care placement vs. remaining at home	1.12***	(1.08, 1.17)
Race/Ethnicity (vs. White)		
Latina	2.15***	(2.06, 2.24)
Black	1.53***	(1.45, 1.62)
Asian/Pacific Islander	0.73***	(0.65, 0.82)
Native American	1.67***	(1.39, 2.01)
Maltreatment Experiences (yes vs. no)		
Recurrence	1.20***	(1.14, 1.25)
Multi-type	1.19***	(1.12, 1.27)
Maltreatment Type (yes vs. no)		
Sexual Abuse	0.97	(0.92, 1.30)
Physical Abuse	1.05	(0.99, 1.11)
Neglect	0.96	(0.90, 1.01)
Emotional Abuse	0.77***	(0.73, 0.82)
Risk of Abuse	0.89***	(0.84, 0.94)

*significant at $p<0.05$; **significant at $p<0.01$; ***significant at $p<.001$

Across maltreatment-related variables, differences that were evident in crude birth rates were either modified or disappeared altogether in the adjusted model. Girls who experienced recurrence[3] and multiple maltreatment types had modestly higher birth rates compared to those who did not. There were no statistically significant differences in birth rates among girls with

[3] Three additional steps were taken to assess whether or not recurrence of substantiated maltreatment was a biased measurement since placement in foster care potentially limits exposure to further incidents of maltreatment. First, the proportion of girls who experienced recurrence was compared according to whether or not they entered foster care. Of those who entered foster care, 42% experienced recurrent maltreatment, while among those who remained at home, only 15% experienced recurrence. Second, the adjusted model was specified omitting the recurrence variable. The resulting hazard ratio associated with first births among girls who entered foster care (*HR*: 1.14; 95% CI: 1.09, 1.19) did not differ substantially from the estimate in the full model (*HR*: 1.12; 95% CI: 1.08, 1.17). Third, a within-group analysis was conducted to assess the association between recurrence and a first birth only among girls who did not enter foster care. The adjusted hazard of a first birth for those who experienced recurrence was 1.17 (95% CI: 1.10, 1.25), which is only slightly lower than the estimate from the adjusted model for the full population (*HR*: 1.20; 95% CI: 1.14, 1.25). These findings indicate that recurrence, as it was coded, is not shifting the main relationship of interest (the association between placement in foster care and giving birth as a teen).

substantiated allegations of sexual abuse, physical abuse, or neglect. Girls with substantiated allegations of emotional abuse and risk of abuse had lower rates of birth than those who did not.

Stratified models by race/ethnicity. In the adjusted model, race/ethnicity was most strongly associated with differences in birth rates. Given this finding, unadjusted and adjusted models were stratified by the three largest racial/ethnic groups in foster care (Latina, White, and Black) to assess whether or not a first birth was more or less impacted by placement in foster care for each of these groups. These estimates are reported in Table 8. Among Latina adolescents, the largest racial/ethnic group that also had the highest birth rates, the unadjusted model indicates that girls who were placed in foster care had rates of birth that were 18% greater than those who remained at home. When adjusting for maltreatment-related covariates, this modest difference was reduced to slightly higher birth rates to Latinas who spent time in foster care vs. those who remained at home. Latinas who experienced recurrence and multi-type maltreatment gave birth at slightly higher rates than those who only had one episode of substantiated maltreatment and a single maltreatment type. The adjusted hazard ratios indicate that there was not an association between higher birth rates and a specific maltreatment type.

Table 9: Extended Cox Models Stratified by Race/Ethnicity

	Latina (N=30,356)		White (N=23,006)		Black (N=11,203)	
	HR	95% CI	HR	95% CI	HR	95% CI
Unadjusted Model						
Foster care placement vs. remaining at home	1.18***	(1.12, 1.24)	1.42***	(1.31, 1.54)	1.19***	(1.09, 1.30)
Adjusted Model						
Foster care placement vs. remaining at home	1.08**	(1.02, 1.14)	1.24***	(1.13, 1.37)	1.09	(0.99, 1.20)
Maltreatment Experiences (ever vs. never)						
Recurrence	1.16***	(1.09, 1.23)	1.22***	(1.09, 1.36)	1.28***	(1.14, 1.45)
Multi-type	1.30***	(1.19, 1.42)	1.07	(0.93, 1.23)	0.99	(0.85, 1.17)
Maltreatment Type (ever vs. never)						
Sexual Abuse	0.92*	(0.85, 0.98)	1.07	(0.94, 1.22)	1.08	(0.93, 1.25)
Physical Abuse	1.03	(0.96, 1.11)	1.21**	(1.07, 1.37)	1.02	(0.89, 1.16)
Neglect	0.88**	(0.81, 0.95)	1.14	(0.99, 1.30)	1.11	(0.95, 1.28)
Emotional Abuse	0.75***	(0.70, 0.81)	0.73***	(0.65, 0.83)	0.93	(0.80, 1.08)
Risk of Abuse	0.86***	(0.80, 0.92)	0.98	(0.86, 1.10)	0.94	(0.82, 1.09)

*significant at $p<0.05$; **significant at $p<0.01$; ***significant at $p<.001$

Similar to Latinas, the unadjusted model indicates that Black adolescents who were placed in foster care had rates of birth that were 18% greater than those who remained at home. However, this difference was rendered insignificant in the adjusted model. In fact, the only variable that was associated with a difference in the rate of a first birth was recurrence of maltreatment. Black adolescents who had multiple episodes of substantiated maltreatment gave birth for the first time at a 28% higher rate than those who only had one episode.

Among White maltreated adolescents, a somewhat different picture emerges. The unadjusted model indicates that among White teenagers, placement in foster care was associated with a 42% greater rate of birth compared to remaining at home. The adjusted estimate, although reduced, is still significant. When accounting for maltreatment-related experiences, White adolescents who were placed in foster care gave birth for the first time at a 24% higher rate than those who remained at home. Recurrence and substantiated allegations of physical abuse were also associated with higher birth rates.

Summary

Within this cohort of girls in California who experienced a first known substantiated allegation of maltreatment after their 10th birthday and before getting pregnant (among those who gave birth), almost 18% gave birth for the first time as an adolescent. Entering foster care as opposed to remaining at home was associated with higher birth rates, but this difference was fairly small. When adjusting for race/ethnicity and maltreatment-related covariates, girls who were placed in foster care gave birth at a rate that was 12% higher than girls who were never in care. Across the three largest racial/ethnic groups in California, the association between foster care and giving birth as a teenager varied by group. This association appeared to be strongest among White teenagers, as they had moderately higher birth rates among those who spent time in care compared to those that did not. Among Latinas there was a minimal increase in birth rates associated with foster care and among Black teenagers there was no evidence of a difference between those who entered foster care and those who remained at home. Both recurrence and experiencing more than one type of maltreatment were associated with increased birth rates and there was no consistent evidence that a specific type of maltreatment increased the rate of a first birth among this population of girls.

CHAPTER 5: DISCUSSION

This was the first U.S. study to use population-based vital birth records to examine the prevalence of childbirth among adolescent girls in foster care and to assess differences in rates of early parenting among maltreated adolescents depending on whether or not there was an entry into foster care. This chapter will discuss the results of each of the analyses in the context of the original hypotheses and previous research findings, followed by a discussion of the limitations of the study, implications of these results for child welfare practice, policy, and future research.

Analysis 1

What is the prevalence of early childbirth among adolescent girls in foster care in California?

The goal of this analysis was to construct a birth rate for adolescents in foster care in California that was directly comparable to the birth rate for the full population of adolescents in the state. Little is known about the epidemiology of giving birth in foster care, and this analysis provides the first population-based data on this issue in the United States. As such, annual birth rates among female adolescents (aged 15–17) in foster care during the same year they gave birth were computed for the five-year period between 2006 and 2010. These rates were compared to statewide birth rates for similarly aged girls in the general population. The same comparisons were generated for the three largest racial/ethnic groups in foster care in the state (Latina, White, and Black). Additionally, how birth rates varied by foster care-related characteristics was examined, as was the foster care status of girls who gave birth as of the estimated date of conception and the date their children were born.

Hypothesis 1

Adolescent birth rates will be higher among girls in the foster care population compared to those in the general population.

Findings confirmed the first hypothesis by indicating that *birth rates among 15- to 17-year-old girls in foster care are higher than among similarly aged girls in the general population of California*. This is not surprising; girls who are placed in foster care represent a very distinct socioeconomic subset of California's adolescent population, defined by a number of risks associated with heightened rates of teen births. Findings only partially validated previous research since these differences were moderate compared to what has been described in other studies (Carpenter et al., 2001; Dworsky & Courtney, 2010; Shaw et al., 2008; Vinnerljung et al., 2007). One explanation for the difference between this and other studies is the difference in adolescent births in California compared to other states. Adolescent birth rates in California are significantly lower than the U.S. rate, and this difference is consistent for both Black and Latina adolescents (Mathews, Sutton, Hamilton, & Ventura, 2010). The denominator for this analysis was also a broader population of adolescents in care than has been examined in other studies since girls were included if they had been in care at any point during the year. On the other hand, this allowed for a more inclusive count of births.

There was a marked and significant decline in the overall birth rate for 15–17 year olds in California between 2006 and 2010. A reduction in birth rates between 2006 and 2010 was observed among girls who were in foster care during the same year they gave birth, but it was less striking and there was no evidence of a statistically significant trend. The absence of an

analogous trend among the foster care population meant that by 2010, the disparity between adolescent girls in the general population and those in foster care had widened. This suggests that the factors that have reduced adolescent childbirth in the general population may have had less of an impact among girls in foster care.

Nationally, in addition to the gradual drop in adolescent birth rates, pregnancy and abortion rates have also declined since 1991, as has sexual activity among adolescents (Kearney & Levine, 2012; Kost & Henshaw, 2014). Economic and policy decisions, such as reduced welfare benefit levels, the expansion of family planning services through the Medicaid program, and weaker labor market conditions (particularly since the onset of the Great Recession) appear to make small contributions to these declines, but there is little evidence that the programs and policies targeted at preventing teen pregnancy have had any role in reducing the rates of teen parenting (Kearney & Levine, 2012). There is evidence, however, that among all adolescents, increases in the effective use of contraception (including condoms and birth control pills) explains a significant and substantial proportion of the reductions in teen pregnancy (Santelli, Lindberg, Finer, & Singh, 2007). Qualitative research conducted with adolescents in care indicate that their access to reproductive health care and effective use of contraception can be problematic, which may provide a partial explanation for the lack of a decline in rates of childbirth in this population (Hudson, 2012; Love et al., 2005).

Again, differences in birth rates between the foster care population and the general population were expected and can also be understood in terms of the differences in the concentration of risk factors for adolescent childbirth (include socioeconomic disadvantage, race/ethnicity, a history of maltreatment, and family conflict) among girls in foster care compared to the general population. In fact, given the potentially cumulative effects of those factors, it is somewhat surprising that birth rates were as low as they were. Girls who gave birth in any given year represented, in absolute numbers, a very small proportion of the full population of 15- to 17-year-old girls in foster care during the year, suggesting that although adolescent mothers in foster care may be quite visible to practitioners and policymakers, giving birth was a relatively infrequent occurrence.

Hypothesis 2

Racial/ethnic disparities in adolescent childbearing will be observed within the foster care population and Latina and Black adolescents in care will be more likely to give birth than White adolescents in care.

Both *Black and Latina girls in foster care were consistently more likely to give birth than their White counterparts*, which confirmed the second hypothesis. This was not a surprising finding given that both groups also have higher adolescent birth rates in the general population. However, it should be noted that racial disparities in adolescent birth rates were diminished relative to those observed in the overall teen population. The reduction in these differences can be partially attributed to the far higher rate of birth to White adolescents in foster care compared to those in the general population, while among Black and Latina adolescents, the differences between the foster care and general population birth rates were relatively modest. That said, the persistence of teen birth rate disparities by race is notable given that children placed in foster care reflect a fairly socioeconomically homogenous subpopulation (Putnam-Hornstein, Needell, et al., 2013).

The dramatic difference in birth rates among White adolescents in foster care compared to their general population counterparts warrants further discussion. This can be explained, at least in part, by the disproportionate rate of poverty among White children in foster care. In one study, the majority of very young children who entered foster care were poor (as measured by their mother's eligibility for public insurance), but the difference in rates of poverty between White children entering foster care and White children in the general population were substantial – 73% of those entering care were poor compared to 19% in the general population (Putnam-Hornstein, Needell, et al., 2013). These differences were not as striking among other racial/ethnic groups. This underscores both the unique profile of White adolescents in care and the contribution of socioeconomic status to the likelihood that all teens in foster care will give birth as adolescents.

Hypothesis 3

Girls who have had multiple moves while in care will have higher birth rates compared to those in more stable placements.

Findings from the present study also documented that the rate of childbirth among teens in care varies across a range of factors related to foster care placement, including placement stability, episode length, and placement type. Among girls who gave birth either while in foster care or shortly before entering or exiting care, several variables emerged as noteworthy correlates. Confirming the third hypothesis, *placement instability was associated with higher birth rates*. Those with nine or more placements during their most recent episode in care had substantially higher birth rates than those with fewer placements. Experiencing such frequent moves was the least common experience among girls in care; on average, the majority (64%) of the population had less than five placement moves but account for only 45% of girls who gave birth. This is consistent with a large body of research that has demonstrated a relationship between placement instability and adverse adolescent outcomes (Aarons et al., 2010; Courtney & Zinn, 2009; Rubin, O'Reilly, Luan, & Localio, 2007; Ryan & Testa, 2005), as well as pregnancy (Dworsky & Courtney, 2010; Dworsky & DeCoursey, 2009). This finding also comports with research on adolescent mothers in foster care who report that they chose to give birth because they believed that parenting would provide a sense of stability, increased attachment and permanence, and the opportunity to be successful in ways their own parents and the foster care system were not (Chase et al., 2006; Knight et al., 2006; Love et al., 2005).

Less expected was the finding that some of the lowest birth rates observed across covariates emerged among girls who had been in foster care for five or more years. In contrast, those who entered care as adolescents and remained in care for less than one year gave birth at markedly higher rates. This aligns with previous research that has demonstrated that children entering care as adolescents are at greater risk of emotional difficulties and behavioral problems (Wulczyn, Barth, Yuan, Harden, & Landsverk, 2005) and that maltreatment (Thornberry et al., 2010, 2001) and foster care placement (Vinnerljung et al., 2007) occurring during adolescence increases rates of early parenting. Further, on average, more than half of girls who gave birth entered or reentered foster care when they were already pregnant. One possible explanation for this finding is that these are adolescents who had been in foster care, ran away or exited care for other reasons, and reentered care while pregnant, although this cannot explain this phenomenon entirely since rates associated with reentry to care were only moderately higher than those associated with a first entry. Another explanation involves the circumstances surrounding entry

into care. In addition to a significant proportion of girls entering care during pregnancy, one out of every five girls who gave birth during they same year they were in foster care entered care after childbirth. Taken together, these findings suggest this may be a population of girls for whom getting pregnant or giving birth were factored into their entry to care. There could be a number of possible scenarios in which this was the case, such as allegations of sexual abuse that resulted in a pregnancy, supervisory neglect due to the adolescent girl's engagement in high risk behaviors (including substance abuse, sexual activity, or association with older or deviant peers) that may ultimately be associated with getting pregnant, or escalating conflict and violence within the family as a response to those behaviors, the pregnancy, or giving birth. Regardless of the scenario, girls who are entering care just before getting pregnant, during their pregnancy, or just after giving birth are likely to have unique risks and needs that have not yet been considered in the literature on foster care and adolescent childbirth.

Differences also emerged with respect to placement type. Girls in guardianship placements had the lowest birth rates, while the highest were observed among those in non-relative foster care followed by congregate care and kin/relative homes. Despite these differences, it is important to note that among adolescents who gave birth while in care (the largest subgroup of girls in foster care who gave birth during the same year they were in care), this was coded as the placement they were in the day they gave birth. As such, these rates likely reflect the placements available to pregnant and parenting adolescents in foster care rather than an association between these placement types and early childbirth. Pregnant girls may have been moved from guardianship placements into more restrictive and potentially less stable placements as a result of getting pregnant or to give birth. Also notable is the fact that there was a downward trend detected for births to girls placed in congregate care, which may indicate that there were fewer residential programs available to serve adolescent mothers and their children.

Analysis 2

Is a history of foster care placement associated with higher rates of early childbirth among maltreated girls in California?

This analysis aimed to further quantify the relationship between placement in foster care and early childbearing among maltreated girls. The analysis assessed the cumulative rate of a first birth among a cohort of adolescent girls who were reported for abuse or neglect, investigated by child protective services, and substantiated for maltreatment. The focus of the examination was to determine whether or not placement in foster care (vs. remaining at home with parents/caregivers) was associated with a higher rate of a first birth as an adolescent and whether or not this association was modified by race/ethnicity and a number of maltreatment-related experiences.

Hypothesis 1

Rates of first birth will be higher among maltreated girls placed in foster care compared to those who remain at home.

For the full population of girls who had a first known substantiated allegation of maltreatment after their 10th birthday, the cumulative rate of a first birth as an adolescent was 17.7 per 100. Among those who subsequently entered foster care, the birth rate was higher than it was for those who remained at home (19.5 vs. 17.1 per 100). The unadjusted hazard of a first

birth as an adolescent was 25% higher for those who entered foster care compared to those that remained at home. Adjusting for race/ethnicity and maltreatment experiences modified this association; in the adjusted model, *entering foster care was associated with a birth rate that was 12% higher among those who entered foster care compared to those who did not*. Although these results confirmed the first hypothesis and were statistically significant, the effect size for the difference between girls who entered foster care and girls who remained at home was quite modest. It was expected that the difference would not be large given the correlation between maltreatment and teen births as well as the fact that adolescents with involvement in the child welfare system represent an already vulnerable population, but differences this low in magnitude were surprising.

The finding that birth rates are only slightly higher among girls in foster care is somewhat consistent with previous research which has indicated that there were no detectable differences in sexual risk behavior and pregnancy among adolescents receiving child welfare services depending on whether or not they were in foster care (James et al., 2009; Leslie et al., 2010; Polit et al., 1989). On the other hand, this finding is less consistent with the rigorous study on the effects of foster care, which indicated that among girls on the margin of foster care placement, those who entered foster care were twice as likely to give birth as an adolescent compared to those who remained at home (Doyle Jr., 2007). The subset of girls included in Doyle's study had a roughly equivalent chance of either entering care or remaining at home. This suggests that among girls whose level of assessed risk or harm may not require foster care placement, the experience of being removed from family and placed into care may have a greater impact on adolescent outcomes than could be observed for this analysis since these data did not include information that would allow for similarly matched groups.

The modest difference in birth rates among girls in foster care suggests that heightened rates of adolescent childbirth observed among adolescent girls in care may be attributed to adverse exposures, including maltreatment and conditions of socioeconomic disadvantage, rather than the experience of foster care itself. Since the expectation is that placement into foster care is reserved for situations in which there is an imminent threat to safety or when reasonable efforts to maintain children in their homes have been unsuccessful, it follows that adolescent girls in foster care should be at greater risk of harm or have more intractable family situations . Although research has not yet identified the factors that consistently predict placement into foster care, studies examining this issue indicate that foster care placement is associated with higher risk across a number of domains, including the level of socioeconomic disadvantage (Barth, Wildfire, & Green, 2006; Britner & Mossler, 2002; Runyan, Gould, Trost, & Loda, 1982; Zuravin & DePanfilis, 1997). If girls in foster care reflect a population with an underlying level of social and familial vulnerability that exceeds that of those who receive child welfare services but do not enter care, rates of birth should be substantially higher according to both theory and research. As such, it could be argued that placement in care may actually be protective and may mitigate the effects of such adversity and disadvantage. Indeed, the finding that transition-age youth who elected to remain in foster care had reduced rates of pregnancy during adolescence (Dworsky & Courtney, 2010) could support this argument.

Alternately, minimal differences between maltreated girls who enter foster care versus those who remain at home could result from policies that have changed the threshold for placement in care. Since the implementation of the Child Welfare System Improvement and

Accountability Act (Assembly Bill 636) in California in 2004, there have been efforts to reduce participation rates, including entries into foster care. Given these efforts, it is possible that there are girls who might have entered foster care prior to AB 636, but are remaining with their families despite a comparably high level of risk or harm. This could be shifting the distribution girls who have the greatest likelihood of adolescent childbirth to be less concentrated among the foster care population. Additionally, it is possible that the focus on girls with maltreatment occurring after their 10th birthday is minimizing real differences in the rate of first births associated with foster care placement, but previous research suggests that the influence of experiencing maltreatment and foster care is stronger during adolescence than earlier childhood.

Hypothesis 2

Experiencing repeated and multi-type maltreatment, as well as more serious forms of maltreatment (sexual abuse, physical abuse, and neglect) will be associated with higher rates of a first birth.

This hypothesis was partially confirmed since *birth rates were higher for girls who experienced recurrent and multi-type maltreatment compared to those who did not*, although the differences were relatively modest in the adjusted model. The effect of these maltreatment experiences has not been tested with respect to adolescent childbearing, but recurrence has been associated with later delinquency (C. E. Hamilton et al., 2002; Lemmon, 2006) and multi-type maltreatment has been correlated with a number of social and behavioral difficulties. Cumulative rates of first births were higher than average among girls who experienced sexual abuse, physical abuse, and neglect. However, there was no evidence of an association between higher birth rates and any particular maltreatment type in the adjusted hazard models. This was unexpected, particularly with respect to sexual abuse, given the well-documented associations between sexual abuse and adolescent childbirth (Noll et al., 2009; Noll & Shenk, 2013). Again, these minimal differences likely reflect the overall vulnerability of the population of adolescent girls who experience substantiated maltreatment and the fact that maltreatment experiences are limited to only those that occurred after age 10 and prior to conception (among those girl who gave birth).

Hypothesis 3

Black and Latina adolescent girls will have higher rates of first birth than their White counterparts. *The relationship between placement in foster care and early childbearing will vary for each of the three largest racial/ethnic groups*.

Descriptively and in the adjusted hazard model, *Black and Latina adolescent girls had higher rates of first birth than White adolescent girls*. Indeed, being Latina was the characteristic most strongly associated with a first birth as a teen in the adjusted hazard model. This finding is not unexpected given the disparities in adolescent childbearing for Latinas in the general population. The potential for such differences was the logic for running stratified hazard models for these three racial/ethnic groups. In the stratified models, *the relationship between foster care placement and early childbearing varied: among Black adolescents, an association between foster care and the hazard of a first birth was not detected; among Latinas, the association was quite modest; and among White adolescents, the association was stronger*. Given these findings, the third hypothesis was confirmed.

Different patterns also emerged with respect to maltreatment experiences in the stratified models. The influence of recurrence held for all three groups, while multi-type maltreatment was only significant for Latinas. Similarly, the absence of a difference in the hazard of a first birth for girls who experienced sexual abuse, physical abuse, and neglect was consistent across all three groups with one exception. White adolescent girls who had a substantiated allegation of physical abuse had a higher rate of a first birth compared to those that did not. Overall, the differences observed and noted for this analysis were all fairly modest, with the exception of the disparity in first births between Latina and White adolescents. This suggests that among this population of adolescent girls experiencing their first known substantiated allegations of maltreatment after their 10th birthday, there is a baseline level of risk for adolescent childbirth that isn't necessarily influenced by particular experiences of maltreatment or placement in foster care.

Limitations

This study has a number of strengths, including large sample sizes for each of the analyses and the unique use of population-based birth record data to provide new epidemiological information concerning births among girls in foster care. It is the first study in the U.S. to use linked child welfare service and birth record data to generate annual birth rates using a broad cross-sectional population of girls in foster care and to estimate the influence of foster care in rates of first birth among maltreated girls receiving child welfare services. These analyses improve upon a fairly limited body of previous research. Despite these strengths, there are several limitations that must be considered, including both limitations of the data used for these analyses and limitations inherent to the study design. One important point for the overall study is that it only measured the outcome of birth. It is unknown how many adolescent girls in California actually got pregnant and whether there is a difference in rates of teen pregnancy between the general population and the foster care population.

Limitations of the data were consistent with what would be expected given the use of administrative data that is not collected for the purposes of research (Drake & Jonson-Reid, 1999). Errors and incomplete data inherent to large-scale administrative data affected the ability to successfully match vital birth records to CPS data. Records were linked using a probabilistic methodology coupled with an extensive clerical review. Although this approach has been validated, it is unknown how many girls should have been matched but were not. Further, the approach to confirming possible matches was fairly conservative, which may have undercounted the number of girls and young women who gave birth and who had a history of involvement with the child welfare system.

Similar to previous work that compared births to adolescent girls in foster care to births in the general population, the present study was not able to account for the effect of socioeconomic status. Birth rates for socioeconomically similar adolescents in California could not be generated since information regarding income for all adolescents in California was unavailable. As such, only general population comparisons were possible, even though girls placed in foster care have a distinct profile of risk and vulnerability. In previous studies using linked vital birth and child welfare service records, public insurance (i.e. Medi-Cal, the state's Medicaid program) as a birth payment method has been used as a proxy for socioeconomic status (see Putnam-Hornstein, Needell, et al., 2013; Putnam-Hornstein & Needell, 2011). The use of this variable for this study was inappropriate since children in foster care are automatically

enrolled in Medi-Cal upon entry and there is no comparable information for girls who did not give birth.

Third, the fact that the reliable historical data on adolescents in foster care only extends to 1999 limits the ability to make inferences about the relationship between maltreatment, foster care placement, and early childbearing. Foster care experiences prior to that year were partially captured for the first analysis (if a girl was in care as of the transition to the new case management system, her records were transferred). For the second analysis, the population was restricted to those that had a substantiated allegation of maltreatment after their 10th birthday since referral and foster care placement information was incomplete. Girls who had substantiated allegations of maltreatment occurring prior to their 10th birthday were excluded. The results of the analysis can only be generalized to other adolescent girls whose first known experiences of substantiated maltreatment and entry into foster care only occurred during adolescence (or after age 10).

The first question was a cross-sectional examination of 15- to 17-year-old girls placed in foster care. Although there was an attempt to crudely characterize longitudinal aspects of girls' foster care placements (e.g., episode length), differences observed in the rates of birth across covariates cannot be causally interpreted. For example, this analysis could not determine whether placement instability contributed to an increased teen birth rate among girls in foster care or other factors contributed to both high levels of placement instability and adolescent childbearing. The timing or reasons for disruptions in placement were also not assessed, including whether placement instability preceded pregnancy, or how those moves affected placement type during adolescence. Similarly, the full history of placement type was not examined, rather only the placement at the time of birth or at the end of the focal episode, which limited the conclusions that could be drawn from the risk associated with where teen girls are placed. By using the removal reason for the focal episode in care, the examination of the effect of maltreatment type on rates of birth among foster youth was also limited and does not reflect exposure to maltreatment over time.

While the second question was longitudinal and was able to capture maltreatment exposure over time, there were still a number of limitations. First, as described above, the population of interest was limited to only those girls with substantiated allegations of maltreatment after age 10. Given the limitations of the child welfare service data, it is unknown whether these were actually their first experiences of substantiated maltreatment. It is possible that girls included in this study had been referred, substantiated, and spent time in foster care prior to 1999. Second, because vital birth records were only available through 2010, births to the youngest girls in the cohort were censored as of that year. Since the number of births increase with age, the cumulative birth rate for this population should be considered a conservative estimate of this phenomenon. Third, beyond the type of maltreatment alleged and the disposition, the characteristics of each allegation are unknown. Specifically, there is no information in the administrative data that would indicate the assessed level of risk or harm. It is possible that the variation in rates of birth in this population would be more adequately captured with more accurate indicators of the potential impact of each maltreatment event.

A final and related point concerns the use of substantiation as the primary inclusion criteria for the population of girls in the study. As such, critiques of substantiation as a

meaningful indicator of maltreatment warrant a brief discussion. A number of scholars have cautioned that the lack of substantiation should not be regarded as an indicator of the child was not maltreated, since a number of factors independent of risk or harm may influence this decision (Drake, 1996; Cross and Casanueva, 2009: English, et al., 2002). Additionally, among children reported for maltreatment, substantiation did not predict long-term behavioral and developmental outcomes (Hussey, et al., 2005). Despite these critiques, substantiation is used as a measure of maltreatment for the purposes of this study because it is a critical CPS decision point that typically serves as a gateway to family court involvement and the family's receipt of formal CPS services and supervision (National Survey of Child and Adolescent Well-Being, 2007).

Implications

Taken together, the findings of the current study indicate that while adolescent childbirth is more common among girls in foster care than girls in the general population, this difference may not be completely attributable to the experience of being in care. The modest differences in rates of first birth with respect to placement in foster care as well as a number of maltreatment-related experiences would suggest that girls reported and substantiated for maltreatment during adolescence are a more homogenous population than was expected. The results indicate that girls in foster care likely represent a distinct subset of the population with a high concentration of risk factors that increase their vulnerability for both foster care placement *and* adolescent childbirth. An obvious candidate as a correlate for both outcomes is socioeconomic and structural disadvantage. Race/ethnicity only partially accounts for this disadvantage and in both analyses, it was a meaningful and substantial correlate of adolescent childbirth. Unfortunately, the child welfare system is not necessarily in a position to prevent or fully address the systematic and entrenched effects of socioeconomic disadvantage on adolescent outcomes. However, the results of this study identified specific characteristics of maltreated girls in care that may increase the likelihood of early parenting. These characteristics point to potential opportunities to provide prevention, intervention, and support services that help girls in foster care delay childbirth or safeguard the health and well-being of pregnant and parenting adolescents.

Child Welfare Policy and Practice

Regardless of whether or not the child welfare system is to blame for elevated rates of birth among girls under its supervision, there is a responsibility to respond to this issue given the challenges faced by adolescent mothers in and exiting from foster care. This study, coupled with previous research, demonstrates that maltreatment itself may be a meaningful driver of early childbirth among this population. Efforts to address the effect of maltreatment and ensure the social and emotional well-being of children and adolescents receiving child welfare services is an emerging policy mandate at a national level (Children's Bureau, Administration for Children and Families, 2012). For the most part, the effect of maltreatment has been framed as a mental health problem requiring timely screening and effective, evidence-based treatment. As discussed in Chapter 2, the decision to parent as an adolescent may be an adaptive and rational response to the socioeconomic and developmental contexts experienced by a majority of adolescents in foster care, rather than the result of an emotional or behavioral disorder. Mental health services may not be the appropriate intervention for preventing early childbirth, but may help to address, at least for some teens, the underlying issues that increase risk for other behaviors associated

with unintended pregnancy, such as unprotected sex and substance abuse (Oshri, Tubman, & Burnette, 2012).

This study also highlights groups within the child welfare system that had higher rates of adolescent birth. Those in foster care appear to be at a slightly greater risk than those receiving services at home, although this relationship may be modified by other factors, including those unmeasured in this study such as: the severity of the maltreatment experienced; the assessed level of risk or harm; other challenges in the family, such as substance abuse or mental illness; and the socioeconomic conditions of the adolescent, her family, and her community. Among those who enter foster care, the distributions of birth rates across placement-related characteristics indicate that girls who gave birth during the same year they were in care are a heterogeneous population. This heterogeneity makes it more challenging to identify the girls in foster care who more likely to give birth during adolescence. Notwithstanding this challenge as well as the limitations of the cross-sectional data used for the first analysis, the results suggest that there may be two possible subsets of girls in foster care who give birth as adolescents: 1) those who get pregnant after spending time in care and whose experience of care is characterized by significant instability and 2) those who enter foster care already at risk for getting pregnant or who are pregnant and parenting

The first group includes adolescent girls who got pregnant after spending time in foster care. Although birth rates were substantially lower for girls who had been in care for one year or more (compared to girls in care for less time), more than half of the births in any given year of the study were to girls in this category. Birth rates were also highest among girls with nine or more placements during the current episode in care and it is likely that the majority of girls with such extreme placement instability were in care for longer than a year. As such, it is conceivable that the girls who get pregnant after spending time in foster care have experiences of placement that are characterized by disruption and minimal permanent or stable relationships. Because they were in care prior to their pregnancy and because multiple placement disruptions make them highly visible to child welfare workers, they could benefit from targeted supports and services that would help prevent unintentional pregnancies. They may also be the subset of girls in foster care for whom the theme of deciding to give birth because parenting provides the chance to create stability and permanence may be particularly salient (Chase et al., 2006; Love et al., 2005). Reducing the level of placement instability is an obvious target for intervention, which is already a focus of child welfare agencies since it is federally monitored outcome measure. Given the uncertainty among child welfare workers as to whose responsibility it is to discuss sexual activity, contraception, and family planning (Shaw et al., 2010), it might be more advantageous to connect adolescent girls to services that are designated and designed for those purposes. Facilitating consistent relationships to reproductive health care providers and clinics regardless of where girls are placed may address the problems with access and effective use of contraception, at least partially (Hudson, 2012; Love et al., 2005).

Girls who enter foster care right before getting pregnant, during their pregnancy, or just after giving birth constitute the second possible group. Although research has demonstrated that compared to infants and children, adolescents who experience maltreatment and enter foster care have unique needs and behavioral issues, the fact that some of the highest birth rates were observed among the population of girls who had been in care for the least amount of time was unexpected. The timing of their entry into care suggests that the circumstances surrounding the

report of maltreatment and removal from their families are likely associated with their pregnancy and/or childbirth. These adolescents present a unique challenge to child welfare workers, since they may be new to the system and experiencing a disproportionate level of vulnerability and current family conflict. Working with such girls may be more complex than working with other adolescents in care, since child welfare agencies must take on a number of tasks and roles simultaneously, including: establishing and maintaining their safety and well-being; supporting young mothers in parenting as effectively as possible given all of the potential constraints keeping the young children of these mothers safe and healthy; and providing opportunities to fulfill social, emotional, and educational goals despite being pregnant or parenting.

Adolescent mothers who are in or recently exited from foster care may be quite similar to adolescent mothers in the general population with respect to their social, economic, and emotional vulnerabilities both before and after giving birth. Among those who have been in foster care, these vulnerabilities are exacerbated by experiences of maltreatment and the potential absence of supportive family members who can provide critical support during the transition to motherhood (Beers & Hollo, 2009). This has important implications for child welfare policy and the availability of services to address these vulnerabilities and attempt to replace, to the extent possible, the supports lost because of maltreatment and family disruption.

One example of services targeted to adolescent mothers in foster care are specialized foster care placements, which, as a result of California Senate Bill 500 (passed in 2005), allow for additional funding and enhanced supports to be provided to teen parents and their infant children, whether or not those children are also wards of the state. Foster care providers, including relatives, non-relatives, or foster family agencies, are required to receive special training to become a "Whole Family Foster Home." Caregivers also have to agree to enter into a Shared Responsibility Plan (SRP) that delineates the responsibilities of the adolescent parent and the supportive services provided by the caregiver to meet the goal of helping teen parents develop the necessary skills to provide a safe, stable, and permanent home for his/her infant. More recently, California Senate Bill 528 included provisions that would have increased supports to adolescent parents in foster care, including subsidized childcare and special conferences for pregnant teens to ensure access to prenatal care, but the bill was passed without these requirements.

The Fostering Connections to Success and Increasing Adoptions Act (Public Law 110-351) and California's version (Assembly Bill 12) extended foster care benefits to transition age youth (through age 21). Since birth rates increase as girls age, it is likely that the foster care system will be dealing with an increasing number of teen mothers in care as more adolescents remain in care after their 18th birthday. A new placement option generated by AB 12 is the Supervised Independent Living Placement (SILP), which allows for transition age youth in care to choose an appropriate living situation and receive financial support to pay for the placement. Recently proposed legislation in California, Assembly Bill 2668, will combine aspects of a SILP placement with the Shared Responsibility Plan (a requirement of Whole Family Foster Homes) to provide specialized placements for older adolescent mothers in care after their 18th birthday, which may help to alleviate the difficulties faces by this uniquely vulnerable population.

Future Research

This study provided the first population-level examination of the epidemiology of teen childbearing among girls in foster care and prompted various questions that can and should be addressed in future research. Perhaps most importantly, an assessment of birth rates to adolescents in foster care and comparisons to the general population while accounting for socioeconomic status should be conducted. In addition to incorporating individual or family-level data on income, education, and other indicators of socioeconomic status, geographic analyses that can assess these relationships based on neighborhood and community level disadvantage is critical to accurately measuring and understanding early childbearing among adolescents in foster care. Future work should use longitudinal data to assess the relationship between placement dynamics in foster care and the timing of both conception and birth. This should also include an examination of reasons for placement moves, the impact and timing of disruptions, maltreatment exposure, and attempts at reunification. Relatedly, the relationship between running away from placement and adolescent childbirth should be examined.

Since this study revealed a unique population of girls who are entering foster care after getting pregnant, studies should be conducted to assess both the circumstances surrounding their entry into care and their experiences of foster care during pregnancy and after giving birth. Outcomes for adolescent girls who give birth while in foster care, including placement-related changes, exit outcomes, and future contact with CPS either for themselves or their young children should also be studied. Finally, birth rates to adolescents with different exposures to the child welfare system should also be generated. For example, a future study could compare the differences in the likelihood of adolescent birth depending on allegation disposition (e.g. unfounded vs. substantiated or evaluated out vs. investigated).

Conclusions

Recent advocacy efforts in California and across the nation have designated girls in foster care as a particular focus of teenage pregnancy prevention since previous research has indicated that this population has markedly high rates of adolescent childbirth. The results of this study indicate that while birth rates are higher among girls in foster care compared to their general population counterparts, the experience of being in care may not be the primary driver of these differences. Adolescent girls in foster care represent a group with a higher concentration of individual, family, and socioeconomic risk factors that contribute to both their placement in care and the likelihood that they will become parents during their teen years. Their involvement in the child welfare system means that maltreated adolescent girls in foster care are an accessible population to whom enhanced prevention services and supports could be delivered. This study generated epidemiological data that can be used to inform the targeting of prevention and intervention resources to girls involved with child protective services. It also provided baseline data that can be used to evaluate the success of such efforts over time.

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