California's Most Vulnerable Parents:
When Maltreated Children Have Children

A Data Linkage and Analysis Project
Funded by and Prepared for the Conrad N. Hilton Foundation

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SUMMARY

The Conrad N. Hilton Foundation has long made its philanthropic charge the support of impactful programs on the ground, advancement of thoughtful public policies, and sponsorship of innovative and applied research with vulnerable populations. Consistent with this vision, the foundation is now working to improve services and outcomes for youths involved with Los Angeles County's child protective services (CPS) system. This ambitious effort includes funding a range of programs, research, and other activities to identify best practices that can then be shared with other funders and implementers, raising both public and private awareness of the importance of investment, alignment, and collaboration in the field of child welfare.

As an initial step in this agenda, the foundation funded a record-linkage study conducted by the University of Southern California, in collaboration with the California Child Welfare Indicators Project at the University of California at Berkeley and the California Department of Social Services. This project led to the linkage of CPS and birth records, generating new knowledge concerning teen birth rates among youth currently and formerly placed in foster care and involved with CPS more broadly. This linked database of integrated birth and CPS records is unique in that it not only offers a "population-level" examination of past CPS involvement among teen mothers, but it also provides an opportunity to prospectively examine health and safety outcomes in the next generation.

Through the linkage of these two data sources, we now have a more complete understanding of teen birth and early-parenting dynamics among CPS-involved teens. It is our hope that this new knowledge can be used to inform future investments in programs and the development of policies that serve to: (1) reduce the rate of teen pregnancy and early parenting among CPS-involved youth; (2) improve services for those CPS-involved youth who are pregnant or parenting; and (3) focus enhanced resources toward current and former CPS-involved youth who are now parenting to prevent child maltreatment in the next generation.

KEY FINDINGS (LOS ANGELES) COUNTY

- *The population prevalence of past CPS involvement among teen mothers is high. Among girls who gave birth, more than 40% had been reported as victims of maltreatment prior to conception; 20% had confirmed or substantiated allegations of abuse or neglect.*

- *Although only a small percentage of all teens in foster care give birth in any given year (~ 4%), tracking births that occur over time provides a more complete picture of the number youth who are parenting during their teens. Among girls in foster care at age 17, more than 25% had given birth at least once before age 20.*

- *Multi-generational involvement with CPS is not uncommon and a maternal history of victimization is a significant risk factor. By age 5, children born to teen mothers who were victims of maltreatment were abused and neglected at twice the rate of other children.*

- *Repeat teen births are not uncommon. Among girls in foster care who first gave birth before age 18, more than 1 in 3 went on to have a second teen birth.*

- *Maltreatment may have health consequences for in the next generation. Among an already high risk population of teens giving birth, a maternal history of maltreatment victimization was a significant predictor of infant low birth weight (< 2500g), even after adjusting for smoking and other known risk factors.*

- *The rate of childbearing was significantly higher among girls in foster care than for girls in the general population of Los Angeles County. Unknown, however, is whether girls in foster care have a heightened teen birth rate compared to socioeconomically similar adolescents in the community.*

PROJECT BACKGROUND

In 2012, more than 139,000 children in Los Angeles County (LA) were reported to CPS as alleged victims of abuse or neglect.[1] Among reported children, 28,523 were substantiated as victims of maltreatment and approximately 10,000 entered an out-of-home foster care placement. There were roughly 19,000 children in child welfare-supervised foster care in LA as of January 1, 2013. Forty-three percent of these children were 11 years of age or older. Among these youth, 32% had been continuously in foster care for more than 4 years; many will ultimately emancipate having not achieved permanency.

A robust body of empirical literature has documented that adolescents in foster care are likely to fare quite poorly across a number of health and well-being domains both while in the system[24] and upon exit.[4,5] One third of adolescents have a diagnosed mental health disorder, developmental disorder, or special need that will likely impede their ability to live independently.[6] Among adolescents who age out of the foster system, 20% will be chronically homeless.[7] These findings have been confirmed by recent research conducted by Dennis Culhane and colleagues (funded by the Conrad N. Hilton Foundation), which documented high rates of public service utilization and general postsystem disadvantage among L.A.'s former foster youth.[8] An area not addressed by this earlier study, however, was the rate at which maltreated youth became parents while involved with the child protection system or shortly thereafter. Data concerning early-parenting dynamics among this population are critical to understanding the extent to which maltreated adolescents may be a distinctively vulnerable group. Further, this information can contribute to the development of prevention and intervention services appropriate to this population.

Although data and research concerning the parenting experiences of foster youth and other maltreated adolescents are relatively scarce, several studies have highlighted large disparities between maltreated and non-maltreated youth in rates of pregnancy and early childbearing.[9-11] In research arising from Mark Courtney's Midwest Evaluation Study, which longitudinally followed a sample of youths as they transitioned out of foster care, the rate of pregnancy among youths who had been in foster care was more than twice that of similarly aged peers in the general population[12]; at the 21-year old survey follow-up, more than 50% of girls had given birth.[10]

Record linkages and analyses conducted by Culhane have provided rich information concerning adversities faced by transitioning youth dually involved with CPS and juvenile justice. Data from the Midwest Evaluation Study have greatly advanced our understanding of pregnancy and parenting dynamics among transition-age youth. The data linkages and subsequent analyses described in this report build on these and other studies of transition-age youth.

REPORT OVERVIEW

This report is organized into four sections. Section 1 provides a broad overview of the literature for readers who may have limited familiarity with the teen pregnancy literature. Although this review does not provide a systematic synthesis of the adolescent and early childbearing research base, it is intended to provide a basic context for understanding the research that follows. In our review we cover epidemiological trends; antecedent risk factors; birth and child outcomes; and the relationship between abuse, neglect, and adolescent pregnancy.

In Section 2, we present a fairly nontechnical description of the record linkages that were completed for this project. This project resulted in the linkage of roughly 1.5 million California birth records to 1 million CPS records. During a second phase of record linkage focused on children born to CPS-involved adolescent mothers, birth records were additionally linked to nearly 200,000 CPS records. After linkages were finalized, we developed unique datasets specific to particular analyses. For example, to examine the cumulative percentage of adolescents in foster care who gave birth before age 20, we identified the full population of 17-year-old girls who were in foster care between 2003 and 2007 (Brief Vol.1-2). To estimate rates of intergenerational maltreatment, we focused on children born to adolescent mothers in 2006 and 2007 so that we had adequate historical and prospective maltreatment information for both mothers and children (Brief Vol.1-3). The details of each analytic dataset are reported in the corresponding research brief.

Section 3 incorporates the analytic research briefs that have been prepared from the linked data. In recognition of the fact that topics may be of interest to different audiences, each brief was written to be read as a standalone product. Four of the five briefs were prepared based on data specific to Los Angeles County; Brief Vol.1-5 reports aggregated statewide findings given that small cell sizes precluded a county-specific analysis. We have, however, also produced statewide reports and tables for Briefs Vol.1-1 through 1-4. These state data tables appear in Appendix A; corresponding state-level reports are available upon request from the authors.

Finally, we conclude this report with a few comments on additional questions that might be addressed using these linked data. We intentionally avoid outlining specific policy or practice recommendations, recognizing that although we were in the position to contribute new knowledge and previously unavailable data to inform discussions, other stakeholders are better equipped to thoughtfully translate these empirical findings.

We look forward to engaging with others in that next phase.

ACKNOWLEDGEMENTS

SECTION 1: LITERATURE

Teen Pregnancy Literature

Epidemiology

Nationwide, teen pregnancy rates have declined by more than 40% during the last two decades, rising briefly in 2006 and 2007 before dropping to a historical low in 2011.[13-15] Still, the United States maintains the highest rate of teenage pregnancy and childbirth among comparable industrialized countries, across ethnic and racial groups, and despite lower or similar rates of adolescent sexual activity.[16] Nearly 750,000 girls aged 15–19 become pregnant each year and more than half give birth.[17] Although state-specific teen birth rates vary greatly, national birth rates for Black and Hispanic adolescents are more than twice that of White teens.[18] Teen pregnancy and birth rates are markedly and consistently higher in Southern states[18] and significantly lower in states where publicly supported reproductive health services and comprehensive sexuality education are provided.[13,19] Despite notable declines in adolescent birth rates, recent estimates suggest that teenage childbirth costs taxpayers more than $10.9 billion annually.[20]

Risk Factors

Socioeconomic. Socioeconomic environments marked by disadvantage, disorganization, and dysfunction are common features of areas with high rates of adolescent parenting.[21] Longitudinal research suggests that youth born to families in poor neighborhoods, with low income, low parental education, single parent households, and larger families have a heightened risk of becoming an adolescent parent.[22,23] Early physical development and earlier sexual debut are likewise correlated to an increased risk of teen pregnancy.[24,25] Research suggests women faced with poverty and limited economic prospects may actively choose pregnancy during adolescence, seeking a sense of purpose and achievement through childbearing and motherhood.[26] Young men in socioeconomically disadvantaged communities may similarly desire the social esteem granted to fathers, and their lack of economic and social opportunities diminish incentive to postpone early pregnancy.[27]

Familial. Behavioral and structural family role-models have been identified as correlates of teen pregnancy. Girls with a family history of teen births are significantly more likely to become pregnant during adolescence,[23] especially those with an adolescent parenting sister.[28] Parental supervision, parent–child closeness, parental values, and positive behavior models have emerged as protective factors against adolescent sexual risk taking and pregnancy.[23,25] Members of two-parent households, especially those with married parents, are

likely to have greater access to economic and other resources, financial stability, and less family turbulence, decreasing risk factors associated with early sexual activity among their children.[29,30]

Antecedent behavioral problems are highly associated with early childbearing, because elevated risk taking is often the result of a chain process[31]; childhood involvement in risky, delinquent behaviors presents as a precursor to adolescent initiation of sexual activity and pregnancy,[32] as do school disengagement, truancy, and dropping out of high school.[2,6] Similarly, a graded relationship has been established between adverse childhood experiences—defined in categories of abuse, neglect, and household dysfunction—and risk of involvement in teen pregnancies.[33] Early-onset psychiatric disorders among girls and boys increase their likelihood of engaging in risk behaviors and sexual activities earlier,[34] and girls diagnosed with serious emotional disturbance are significantly more likely to have a first pregnancy by age 18.[35]

Child Outcomes

Infants born to teenage mothers have a heightened risk of prematurity, low birth weight, and neonatal mortality,[36,37] with the risk of adverse birth outcomes greatest among infants born to younger adolescent mothers.[38,39] Children of adolescent pregnancies often share the sociodemographic adversities of their mothers, reflected by heightened rates of developmental delays, hospitalization, academic failure, and poor social outcomes.[37,40] In young adulthood, children of adolescent mothers tend to experience low levels of education and heightened rates of mental health issues.[41] In a Canadian study, children born to mothers who became parents during adolescence accounted for a significant share of youths in foster care (51%), young adults on welfare (44%), and next-generation teen mothers (56%).[37] Daughters of teenage mothers are 66% more likely to become adolescent mothers, after accounting for other risks.[42] This intergenerational pattern likewise extends to men, with sons of teenage fathers nearly twice as likely to be adolescent parents themselves.[43]

Rapid Repeat Births

Although close to half of all pregnancies in the United States are unintended, rates among girls aged 15–19 are significantly higher.[44] Unintended pregnancies may result from inaccurate beliefs concerning the likelihood of conception[45]; limited or misunderstanding of contraception, resulting in nonuse[45,46]; inconsistent pregnancy intentions[47]; and ambivalence toward pregnancy and childbearing.[46,48] Efforts to prevent the negative maternal and child outcomes associated with adolescent childbearing are exacerbated by a trend of rapid repeat childbirths by teen mothers. Recent data suggest that 18% of adolescent childbirths are not first births,[15] and rapid repeat pregnancies within 12–18 months among primiparous teen mothers are not uncommon.[49] Although nearly

all first teenage pregnancies in the United States are unintended,[16] one third of repeat pregnancies are reported by adolescent mothers as intentional.[50]

Teen Pregnancy and CPS Involvement

Childhood and Adolescent Maltreatment

Although the relationship between sexual abuse and adolescent pregnancy has been most rigorously studied, childhood physical abuse, sexual abuse, and neglect have all emerged as correlates of teen parenthood.[51-54] Yet, despite evidence linking childhood maltreatment to teenage childbearing, whether teenage parenting is caused by childhood maltreatment or merely reflects shared environmental risk factors has been questioned.[55,56] A review of research conducted between 1980 and 2000 found insufficient evidence to conclude the existence of a causal relationship between childhood maltreatment and subsequent adolescent pregnancy, citing differing types of predictive abuse, conflicting definitions of abuses, and methodological weaknesses.[57] Yet, in a more recent meta-analysis of 21 studies, childhood sexual abuse was found to more than double the odds of adolescent pregnancy,[54] and another recent prospective study found that adolescents substantiated for sexual abuse or neglect within the past year were twice as likely to experience teen childbirth as their nonmaltreated counterparts, after adjusting for potential confounders.[58]

Placement in Foster Care

Youth involved with the CPS system are characterized by high rates of health and sexual risk behaviors,[59] including earlier engagement in sexual activities and an increased likelihood of sexually transmitted infections.[60,61] Girls in foster care are 2.5 times more likely than other girls to be pregnant by age 19[9]; nearly one third (32%) of girls who have been in foster care have at least one child by age 19.[6,9] Additionally, foster youth face high rates of early childbearing after exiting foster care,[12] with a birthrate in young adulthood that is nearly 3 times higher than that of the general population.[62] Overall, girls placed in foster care tend to participate in high-risk sexual behaviors, experience early initiation of sexual intercourse, and have heightened rates of early childbearing.[63,64]

SECTION 2: METHODOLOGY

This project linked administrative CPS records to population-based vital statistics birth records. In this section, general record-linkage methodologies are explained, the administrative data sources that were linked in this project are described, and the steps that were undertaken to prepare each data file for linkage are detailed.

Administrative Data

Historically, administrative data were maintained as paper records and their utility for research and evaluation was limited.[65] Paper records were (not surprisingly) burdensome to compile, expensive to share, and often contained high rates of clerical errors. Technological advances in computing, however, have made administrative records an increasingly valuable source of data for research,[66] including the study of child maltreatment.[8,67] The strengths of administrative data are numerous. Administrative data offer complete coverage of a population not subject to the uncertainties of sampling errors; records can be configured longitudinally, allowing events such as the receipt of specific services to be tracked over time; and in a time of budget shortfalls, the cost of analyzing these data is minimal compared to the resources that would be required to collect survey data.[68] Yet, an inherent limitation of administrative data is the scope of information contained in any one system. Because administrative data are collected during the normal course of agency operations, with recorded information typically limited to items of direct relevance to a particular agency's administration of programs and services, key variables of interest are frequently missing.

Fortunately, just as computers have streamlined the once onerous process of compiling and managing administrative records, unprecedented advances in technology have also largely eliminated the labor-intensive process of record linkage and low match rates between databases.[69] Information captured for individuals in one database can be linked with information captured for those same individuals in other databases. Record linkage entails "the bringing together of information from two records that are believed to relate to the same entity."[69(p81)] The entity may be an individual (or some other unit) appearing across multiple files or an individual who appears multiple times within a given file. When individual-level data are involved and individuals are correctly linked across data sources, the quantity of data is literally multiplied. As the U.S. Government Accountability Office noted, linkage projects "have many potential benefits, such as informing policy debates, tracking program outcomes, helping local government or business planning, or contributing knowledge that, in some cases, might benefit millions of people."[70(p1)]

Data Sources

Two independent, statewide data sources were linked in this project: (1) vital statistical birth records and (2) child protective services records.

Vital Statistics Birth Records

Confidential master birth record files were obtained from the California Department of Public Health for the period spanning 2001–2010. These files provide a census of all registered births in California and contain a range of demographic, pregnancy, and birth-related data elements.

Child Protective Services Records

CPS records from California's Child Welfare Services/Case Management System (CWS/CMS) were available through a longstanding interagency data collaboration between the California Child Welfare Indicators Project at the University of California at Berkeley and the California Department of Social Services (CDSS).

Record Linkages

Two basic record-linkage methodologies exist for establishing exact matches: *deterministic* and *probabilistic*.[69] In deterministic record linkage, two records are designated a match when the records agree exactly on a set of linkage variables. If a Social Security number is the sole linkage variable, then a comparison pair will be considered a link if the Social Security numbers captured in two records agree exactly on every digit. If multiple match variables that are nonunique are used—for example, first name, last name, and year of birth—then a deterministic methodology requires character-for-character matching on one or more of these variables.

Probabilistic record linkage differs from deterministic linkage in that it does not require perfect agreement between matching variables to link a pair of records, relying instead on a formal statistical model. This statistical model is used to compute a numerical value that captures the similarity of two records based on the probabilities of agreement and disagreement for the specified match variables. Record pairs that are deemed links or matches are those for which the ratio of the probabilities of agreement and disagreement, or the degree of difference between files, suggests that it is highly likely the two records contain information for the same individual.

When a unique identification number (e.g., a Social Security number) has been (1) assigned to each individual, (2) verified, and (3) common to all files, record linkages are relatively straightforward and deterministic strategies are often

employed. The strength of a deterministic linkage lies in its *specificity*: a deterministic strategy is unlikely to establish a link for comparison pairs that are not actually matches and *false positive* matches are rare. Yet, few linkage projects are so simple. Frequently, files are large, lack unique identifiers, capture information in nonstandardized formats, and contain many errant values. The weakness of deterministic strategies is that many true matches are missed, its *sensitivity* can be low, and it frequently has high rates of *false negative* matches.

In this project, probabilistic linkage strategies were employed for all record linkages. This strategy has become increasingly sophisticated during the last decade and has been verified as a superior method for linking files that do not have a common unique identifier. Because the data sources lacked a common unique identifier, contained nonunique identifiers that had not been verified, and consisted of hundreds of thousands of records each, it was arguably the only strategy that could be employed. As described in the sections that follow, however, efforts were made to employ the strictest criteria for establishing linked pairs.

Software

All record linkages were completed using Link Plus, an open-source (i.e., free and in the public domain) linkage software developed by the Cancer Division of the U.S. Centers for Disease Control and Prevention (CDC). Although Link Plus was written as a probabilistic record linkage tool for cancer registries (as part of the CDC's National Program of Cancer Registries), it can also function as a standalone Windows-based application for record linkage between any two data files. Link Plus was designed by a statistician following a review of the relevant record linkage literature since 1969 and can work with as many as 4 million records. The software is available for download from the CDC. In an evaluation of the linkage algorithms underlying Link Plus, it was deemed a powerful linkage tool and outperformed basic deterministic methodologies.[71]

Theoretical Underpinnings

Link Plus conducts probabilistic record linkages based on the theoretical foundation developed by Fellegi and Sunter, who are credited with developing the formal mathematical models underlying modern record linkages.[69,72,73] The Fellegi and Sunter model extends the pioneering work of Newcombe and associates, who first introduced the use of "machines" to conduct fully automated record linkages based on probabilities derived from the frequency distributions of the matching variables.[74]

Using the Fellegi and Sunter framework, record pairs are partitioned into a true set of matches (M) and a true set of nonmatches (U), with *m*-probabilities and *u*-probabilities estimated as match parameters. Consider *P*(*B*) to equal the

probability that a given birth record and a given death record refer to the same child. Consider also that A_1 is some matching variable—say, date of birth—that is the same in both the birth file and death file. $P(A_1 \mid B)$ is then the probability that date of birth matches in both files given that the birth and death record refer to the same child. This probability is known as the *m*-probability (*m*) in record linkage terminology. Also estimated is the *u*-probability (*u*), or the probability that date of birth is the same by chance, despite the fact that the record pair being compared is not a match.

Accompanying *m*- and *u*-probabilities are *agreement weights* and *disagreement weights*. An agreement weight is the weight assigned when there is agreement on a given match variable and is computed by taking the base 2 logarithm of the ratio (*R*) of the *m*- and *u*-probabilities described above; a disagreement weight is simply the base 2 logarithm of [1 – *m*] / [1 – *u*]. This likelihood ratio will be large for agreement patterns that are frequently observed among matched records, yet infrequently observed among nonmatches. It will be small when the agreement patterns are observed with some frequency among nonmatches. These weights are used to assign each comparison record pair a match weight or score. Based on these scores, Fellegi and Sunter proposed a decision rule specified as:

> If *R* > *UPPER*, then designate the pair as a match

> If *LOWER* ≤ *R* ≤ *UPPER*, then designate the pair as a potential match and conduct clerical review

> If *R* < *LOWER*, then designate the pair as a nonmatch

The cutoff thresholds *UPPER* and *LOWER* are determined by a priori errors bounds. Using this decision rule, record pairs with a weight that exceeds the upper cutoff are classified as *designated matches*. Record pairs with a weight that falls below the lower cutoff are classified as *designated nonmatches*. All remaining pairs are classified as *designated potential matches* and manually reviewed.

Phonetic Coding Systems

The Link Plus software offers users two phonetic coding systems: the Soundex System and the New York State Identification and Intelligence System (NYSIIS). Each of these phonetic systems classify string or character entries based on pronunciation. As such, these systems serve to reduce missed record matches through accommodations for spelling errors and minor letter transpositions. NYSIIS was used as the phonetic system in this research because it has been shown to have a reported accuracy that is 2.7% better than the Soundex System and because there is research to suggest that NYSIIS is better equipped to

handle Spanish names—a particularly salient point because this research took place in California, where more than 50% of children are of Latino ethnicity.

String Comparators

Partial matching in Link Plus is based on the Jaro–Winkler metric, a string comparator that assesses the degree of agreement between two strings. Because typographical data-entry errors often occur in administrative data, matching two records based on exact character-by-character agreement can result in many missed matches.[75] The basic Jaro string comparator accounts for random character insertions, deletions, and transpositions and is considered to be among the most powerful comparators in the computer science literature.

Blocking Variables

Blocking is a scheme to reduce the total number of record comparisons required to identify a match. Blocking variables serve to "partition the database into a large number of small segments so that the number of pairs being compared is of a reasonable size."[69(p125)] Consider the birth and CPS record linkages conducted in this research. The 2006 birth cohort file (file *A*) consisted of approximately 500,000 records. The child welfare file for children born in 2006 included roughly 90,000 records (file *B*). This means that the total number of possible record pairs (a,b) in which a ϵ A and b ϵ B is equal to the product space *A* x *B*, or 45 billion. Because the maximum number of matches is equal to the number of records in the smaller file (file *B*), this would mean that in the absence of blocking, billions of comparisons would be required even though (at most) only 0.000002% of those comparisons would result in a match.

Link Plus utilizes an "or" blocking methodology in which record comparisons are made between two files if they contain identical values on at least one of the specified blocking variables. This methodology is equivalent to taking multiple passes at the data in the sense that record pairs are compared if they have identical values on at least one of the blocking variables (versus attempting record linkages based on multiple runs of the data, each of which is based on a different blocking variable).

Matching Variables

Beyond exact (character-for-character) matching, Link Plus provides several options for using partial, value-specific, and "fuzzy" matching methodologies. It also includes matching options specifically configured for variables commonly used in record linkage (e.g., Social Security numbers) that incorporate several different techniques.

Names. First names, middle names, and last names were coded as separate fields in each data source and matched using the Link Plus matching method developed for names. This method incorporates partial and value-specific matching (see additional details below), as well as the NYSIIS phonetic code, to account for minor typographical errors, misspellings, and hyphenated names. For a hyphenated name, this method compares substrings separated by the hyphen with the other name of the comparison pair. For a comparison pair with the same name, the frequency of this name is incorporated into the computed weight of the pair so that a common name results in a low weight and a rare name results in a high weight. For parent-level matches, name frequencies were derived from each annual CPS file and for child-level matches, those frequencies were derived from birth files.

In addition to general name methodology, Link Plus incorporates a file of nicknames against which unmatched first names within a comparison pair can be referenced. If one of the unmatched first names in a pair appears on the nickname list, it is then checked against an accompanying list of associated full names to determine a possible match. Link Plus also includes a middle name methodology that allows for the occurrence of a middle initial rather than a full middle name.

Exact. An exact character-for-character string comparison methodology was used to match child's sex.

Date. All dates were matched using a Link Plus date methodology that treats day, month, and year as three separate components. If all three components match, the comparison pair is assigned a high weight (w). If there is agreement on year and month but day is missing, the weight ($w1$) will be positive but less than w. If there is agreement on year but month and day are missing, the weight ($w2$) will be positive but less than $w1$. The date method also checks for transposition of components (i.e., day and month).

Value Specific. The value-specific methodology is a frequency-based method. It assigns value weights to a given match based on the frequencies of those values in the files being linked. A match on a frequent value is associated with a low weight, whereas a match on a rare value is associated with a high weight. This method was used for linkages based on race and is also incorporated into the Link Plus names method.

SSN. Link Plus includes a matching method that was created specifically for linkages using Social Security numbers. This method incorporates partial matching to account for typographical errors and transposition of digits, as well as SSNs with only the last four digits present.

Data Cleaning

Prior to performing any linkages, all variables were systematically reviewed, cleaned, and standardized. Data reviews were conducted by running frequency distributions to identify clearly errant values in both numeric and string variables. For example, a quick scan of the frequency tabulation for the middle name variable in the birth datasets returned multiple instances in which the text field had been entered as UNK, UNKNOWN, UKNOWN, or MISSING. Similarly, these same entries appeared with some regularity in CPS data. Cleaning was also conducted for numeric variables with values that fell outside of clearly defined bounds on the set of admissible values.

Format standardization of all variables used in the matching process was also completed. For example, the sex variable was coded numerically in the birth datasets (e.g., 1, 2) and as full-word text in the CPS data (e.g., MALE, FEMALE). For Link Plus to successfully match variables across data sources, variables must be coded and formatted according to the same conventions. As such, dates were consistently formatted as YYYYMMDD across all data sources, variables such as sex and race were comparably formatted as text fields, and where applicable, missing values were recoded as blank fields.

Because probabilistic methodologies allow for partial record agreement and often use information from a greater number of possible identifiers, the number of matched pairs tends to be higher. Yet, because records may be linked based on lesser degrees of shared attributes, this strategy is accompanied by the downside of an increased likelihood of false positive links. Thus, probabilistic strategies trade some degree of specificity for the advantage of greater sensitivity.

Record linkage amounts to messy-data analysis and notwithstanding increasingly sophisticated probabilistic algorithms for automated record linkages, "the only 'gold standard' for whether two records truly match is still the judgment of a human reviewer."[76(p186)] The fact is that computers cannot yet beat the power of human pattern recognition. Record linkages remain part science and part art, and the best method for establishing linkages between datasets without unique and verified identifiers is a probabilistic method (i.e., the science) followed by a carefully conducted clerical review (i.e., the art).[69,77,78]

Data Linkages

Record linkages were completed in several phases. For each set of linkages, a clerical review of all uncertain matches was conducted based on match criteria established a priori.

Phase 1 Linkages. To identify young women who gave birth and had a history of or current CPS involvement, we constructed a CPS extract of unduplicated records for young women between the ages of 12 and 24 during each year between 2001 and 2010. We then systematically linked these CPS files to annual birth files to document whether there was a maternal history of CPS involvement among adolescents and young women who gave birth in a given year and to document whether an adolescent or young woman involved with CPS had given birth.

Table 1 presents the results of these linkages across all 10 years of the study period. It should be noted that the count of young women with CPS history increases between 2001 and 2010 because these counts reflect the cumulative number of young women between the ages of 12 and 24 who had ever been reported for maltreatment or placed in foster care since 1998.

Table 1: Linkage Results for Young Mothers in Birth Records and Young Women with CPS Histories in California, 2001–2010

	Total Births	Births to Young Mothers 12-24 years	Young Women with CPS History	Matches	CPS History Among Young Mothers	Births to Young Women with CPS History
	N	N	N	N	%	%
2001	530,743	164,842	303,841	14,911	9.1	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	4.7
2005	552,573	163,256	665,436	31,597	19.4	4.8
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

Phase 2 Linkages. During the second phase of linkages, we prospectively linked all infants born in 2006 and 2007 to CPS records through each child's fifth birthday. These linkages allowed us to ascertain which children were reported for maltreatment during the first 5 years of life. Further, because these same birth records had been linked to historical CPS records for mothers (during the first linkage phase), we were able to construct an intergenerational record of both maternal and child CPS involvement. Results from these child-level linkages are presented in Table 2.

Table 2: Linkage Results for Children Born in 2006–2007 and Reported for Maltreatment before the Age of 5 in California

	Births	CPS Reports	Matches	Children Reported to CPS by age 5	CPS Reports Matched to a Birth Record
	N	N	N	%	%
2006	564,680	99,862	85,588	15.2	85.7
2007	571,520	99,000	83,728	14.7	84.6

Phase 3 Linkages. Finally, to identify young men who became fathers and had a history of or current CPS involvement, we constructed a CPS extract of unduplicated records for young men between the ages of 12 and 24 in 2010. We linked this CPS file to the 2010 birth file to document whether there was a paternal history of CPS involvement for those births in which paternity was established (and to document whether an adolescent or young man involved with CPS became a father). Table 3 reports the results of these male linkages based on records in which paternity had been established. Given the high rates of missing paternity and uncertainty of our matches, we did not further analyze linked records for male adolescents.

Table 3: Linkage Results for Young Fathers in Birth Records and Young Men with CPS Histories in California, 2010

	Total Births with Paternity Established	Births to Young Fathers 12-24 years	Young Men with CPS History	Matches	CPS History Among Young Fathers	Births to Young Men with CPS History
	N	N	N	N	%	%
2010	465,102	88,135	928,028	16,313	18.5%	1.8%

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SECTION 3: FINDINGS

Research Brief Vol.1-1: *A Population-Based Examination of Maltreatment History among Adolescent Mothers*
This analysis used linked birth and child protective service records to develop the first population-level estimate of maternal maltreatment victimization among adolescent mothers. Findings document that a significant share of adolescent mothers have had contact with child protective services as alleged or substantiated victims of abuse or neglect. These data underscore the importance of better understanding the impact of childhood and adolescent maternal maltreatment on both early childbearing risk and subsequent parenting capacity.

Research Brief Vol.1-2: *Cumulative Teen Birth Rates among Girls in Foster Care at Age 17*
This analysis generates population-level estimates of the incidence of first and repeat births among girls in foster care. Using the full population of girls in foster care at age 17 between 2003 and 2007, we computed the cumulative percentage and characteristics of foster youths with a first or repeat birth by different ages. Findings document that more than 1 in 4 girls in foster care at age 17 gave birth during their teens; among girls with a first birth before age 18, nearly 40% went on to have a second teen birth.

Research Brief Vol.1-3: *A Longitudinal Study of Adolescent Mothers and Intergenerational Child Protective Services Involvement*
This analysis generated the first population-based estimates of the transmission of abuse and neglect across generations using linked birth and child protection records. A maternal history of alleged or substantiated maltreatment emerged as the strongest predictor of offspring maltreatment by age 5, after adjusting for other risks. These data highlight the potential for targeting prevention and early intervention services to adolescent mothers with histories of abuse or neglect.

Research Brief Vol.1-4: *A Cross-Sectional Study of Birth Rate Trends among Female Foster Youth*
This study produces birth rate estimates for 15 to 17 year-old female youth who spent time in foster care between 2006 and 2010. Results indicate that although only a small number of female foster youth gave birth, the rate of childbearing among 15 to 17 year-old female foster youth is higher than female youth in the general population of Los Angeles County. Female youth who were in foster care for shorter periods of time and experienced greater placement instability were more likely to give birth. Among girls who were in foster care and gave birth – roughly half became pregnant before entering care.

Research Brief Vol.1-5: *Infant Birth Weight and Maltreatment of Adolescent Mothers*
This analysis examined the maltreatment history of adolescent mothers as a predictor of a low birth weight infant (< 2,500 grams). Findings suggest that adolescents substantiated as victims of abuse or neglect were more likely to give birth to an infant of low birth weight than were sociodemographically similar adolescents who had not been maltreated.

California's Most Vulnerable Parents
A Population-Based Examination of Maltreatment History among Adolescent Mothers

Vol 1-1. A Population-Based Examination of Maltreatment History among Adolescent Mothers

This analysis used linked birth and child protective service records to develop the first population-level estimates of maternal maltreatment victimization among adolescent mothers. Findings document that a significant share of adolescent mothers have had contact with child protective services as alleged or substantiated victims of abuse or neglect. These data underscore the importance of better understanding the impact of childhood and adolescent maltreatment on both early childbearing risk and subsequent parenting capacity.

INTRODUCTION

Demographic, socioeconomic, and environmental characteristics of adolescent mothers have been well documented.[1,2] Adolescents who give birth are disproportionately from low-income families[3] and neighborhoods,[4] and are more likely to have experienced early puberty.[5] A history of sexual abuse and other forms of maltreatment has been linked to adolescent pregnancy risk,[6-9] with notably higher birth rates observed for adolescents in fos-

> No studies to date have documented the population prevalence of prior child protective service involvement among adolescents who give birth.

ter care compared to the general population.[10] Yet, no studies to date have documented the population prevalence of prior child protective service (CPS) involvement among adolescents who give birth. In this study, we used linked birth and CPS records from Los Angeles County to produce the first population-based estimates of documented maltreatment reports, substantiated victimization, and foster care placement among adolescent mothers.

METHODS
DATA SOURCES

Birth records for 2009 were obtained from the California Department of Public Health. Personally identifiable data were extracted for mothers, ranging from 12 to 19 years of age (N=47,816). This information was used to probabilistically link adolescent mothers to CPS records maintained by the California Department of Social Services. Records were available dating back to the establishment of the current CPS case management system in 1998. We excluded adolescents who were born in another state (N=2,119) or country (N=11,093) given an increased likelihood that they were not living in California for the entire window in which CPS records were available.

These data were then restricted to adolescent births occurring in Los Angeles County. Birth records provide two means of classifying geography: (1) based on the county in which the birth took place and (2) based on maternal county of residence. We chose to focus on births that took place in Los Angeles County but also examined reported rates based on maternal county of residence; across all covariates, differences were minimal (< 1%).

Linkages were approved by state and university committees for the protection of human subjects and were approved by California's Vital Statistics Advisory Board.

VARIABLES

Adolescent mothers were classified as reported for maltreatment if a record of alleged abuse/neglect was identified in the CPS data. We included reports that were both investigated and screened out by CPS. We then stratified adolescents into three nonexclusive groups: (1) one or more reports of maltreatment; (2) one or more substantiated reports of maltreatment; and (3) one or more foster care episodes. Because we were interested in CPS involvement prior to pregnancy, we excluded reports and placements after the estimated date of conception.

We explored demographic variations in the prevalence of CPS involvement. Stratifications included maternal age at birth (12-15 years, 16-17 years, 18-19 years); maternal race/ethnicity (Black, White, Latina, Asian/Pacific Islander, Native American); and whether this was a first birth (first, repeat). We also examined markers of maternal socioeconomic status and health risks, including the trimester prenatal care began (first, second, third, no care/missing) and birth payment method (public, private). Finally, we coded the population prevalence of the four most common forms of reported and substantiated maltreatment (sexual abuse/exploitation, physical abuse, neglect, emotional abuse).

29%, more than 1 in every 4 adolescent mothers who gave birth, had been reported for neglect at some point before pregnancy.

ANALYSIS

Based on 2009 birth records, we reported the characteristics for the full population of adolescent mothers who were born in California and then gave birth in LA county. We then calculated the percentage of adolescents who had been previously reported, substantiated, or placed in foster care by maternal characteristics. Distributional differences were assessed using X^2 tests. Although we report p-values, the large number of observations meant that even modest differences emerged as statistically significant. Therefore, we focus our discussion of results on the variations of greatest magnitude.

RESULTS

Our population included 10,350 adolescent mothers. Of these, 4,276 (41.3%) had been reported for alleged maltreatment victimization during the prior decade, 2,040 (19.7%) had been substantiated as maltreatment victims, and 988 (9.6%) had been placed in foster care (see Table 1). Statistically significant variations (p < .05) in the prevalence of past CPS involvement emerged for all variables with the exception of maternal age at birth by foster care placements (p = .584).

Among 12- to 15-year-olds, 52.7% had been reported to CPS for maltreatment, 28.7% had been substantiated as victims, and 9.0% had been placed in foster care. At the other end of the age distribution, the figures for 18- to 19-year olds were 39.0%, 18.4%, and 9.8%, respectively. Of the 16.8% of adolescent mothers for whom this was a repeat birth, 55.1% had been previously reported for maltreatment. Notable variations were observed by maternal race/ethnicity. Among Black adolescents—a group disproportionately represented in LA's child protection system—a majority of young mothers had been reported as possible victims of abuse or neglect (56.7%) and more than 1 in 5 had spent time in foster care. Latina mothers accounted for 79.9% of all adolescent births, but had relatively lower rates of past CPS involvement. Although small numbers mean that rate estimates should be interpreted cautiously, more than half of Native American adolescent mothers had been substantiated as victims of maltreatment.

As depicted in Figure 1, more than 1 in every 4 adolescent mothers who gave birth (29.0%) had been reported for neglect at some point before pregnancy, while 18.4% and 15.2% had been reported as alleged victims of physical and sexual abuse, respectively. A similar prevalence pattern emerged when substantiated reports were examined by maltreatment type.

Read the full *California's Most Vulnerable Parents* report, other research briefs, a fact sheet, and more at hiltonfoundation.org/teenparentsreport

TABLE 1

	Adolescent Births (n = 10,350)		Reported for Maltreatment (n = 4,276)		Substantiated as Victim (n = 2,040)		Placed in Foster Care (n = 988)	
	n	col%	row %	χ^2	row %	χ^2	row %	χ^2
Maternal Age at Birth								
12–15 years	543	5.3	52.7		28.7		9.0	
16-17 years	3,068	29.6	44.3	$p < .001$	21.1	$p < .001$	9.2	$p = .584$
18-19 years	6,739	65.1	39.0		18.4		9.8	
Birth								
First birth	8,604	83.2	38.5	$p < .001$	18.3	$p < .001$	8.9	$p < .001$
Repeat birth	1,741	16.8	55.1		26.7		12.9	
Race/Ethnicity								
White	554	5.4	42.6		20.4		11.0	
Black	1,329	12.9	56.7		33.1		23.7	
Latina	8,248	79.9	38.7	$p < .001$	17.4	$p < .001$	7.2	$p < .001$
Asian/Pacific Islander	164	1.6	37.8		20.7		8.5	
Native American	18	0.2	83.3		55.6		27.7	
Initiation of Prenatal Care								
First trimester	7,244	70.0	40.8		19.7		9.5	
Second trimester	1,118	10.8	41.1		18.7		8.0	
Third trimester	1,611	15.6	42.3	$p = .049$	19.2	$p = .057$	9.4	$p < .001$
None / missing	377	3.6	47.8		24.9		14.9	
Birth Payment Method								
Public	8,310	82.1	43.0	$p < .001$	21.2	$p < .001$	10.6	$p < .001$
Private	1,808	17.9	33.7		12.8		4.7	

Notes: Summed counts may not equal "adolescent births" column total due to missing values for some variables. Summed percentages in "adolescent births" column may not equal 100% due to rounding. Percentages reported for referred for maltreatment, substantiated as victim, and placed in foster care reflect the population prevalence of these child protection events for each variable level (e.g., 56.7% of Black adolescent mothers who gave birth in LA County in 2009 were previously reported for maltreatment). Adolescents who gave birth in LA county, but who were born outside of California were excluded given our inability to account for CPS involvement outside of the state.

FIGURE 1

Percentage of Adolescent Mothers Who Gave Birth in Los Angeles County in 2009 and Were Reported or Substantiated for Pre-Conception Neglect, Physical Abuse, Sexual Abuse, or Emotional Abuse
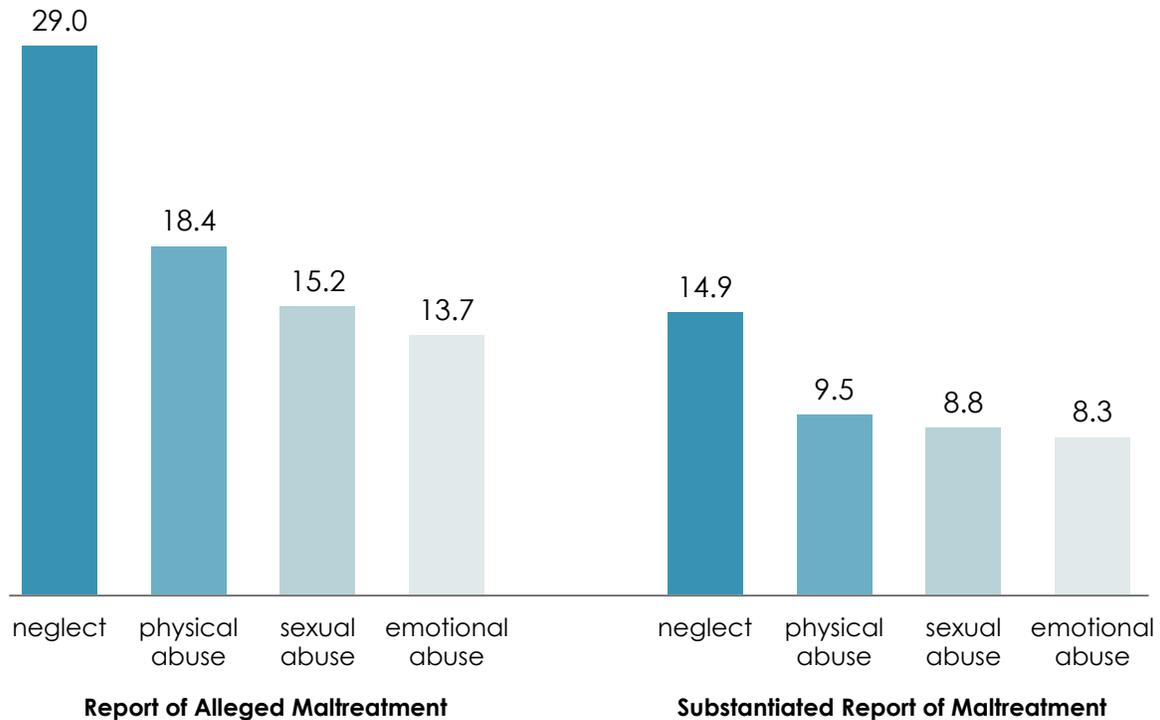
Notes: Percentages reflect the share of adolescent mothers with any history of alleged or substantiated neglect, physical abuse, sexual abuse, or emotional abuse. Adolescents reported and substantiated for more than one form of maltreatment appear in more than one category. Adolescents who gave birth in LA county, but who were born outside of California were excluded given our inability to account for CPS involvement outside of the state.

DISCUSSION

Although prior research indicates a heightened risk of early childbearing among adolescents with a history of maltreatment,[9] no studies have estimated the population prevalence of officially reported maltreatment among adolescents who give birth. This descriptive analysis used linked birth and CPS records to generate the first population-based estimates of adolescent mothers reported for maltreatment, substantiated as victims, and placed in foster care. Although caution should be used when making generalizations and findings should not be interpreted causally, these data indicate that more than 4 of every 10 adolescents who gave birth in Los Angeles County in 2009 had been previously reported to CPS as a victim of abuse or neglect and nearly 20% of these young mothers had been substantiated as victims of maltreatment before pregnancy.

More than 4 of every 10 adolescents who gave birth in Los Angeles County in 2009 had been previously reported to CPS as a victim of abuse or neglect and nearly 20% of these young mothers had been substantiated as victims of maltreatment before pregnancy.

The prevalence of childhood and adolescent maltreatment reported in this research brief should be viewed as a lower-bound estimate of past CPS involvement given our inability to examine CPS records prior to 1998. This means that for a 12-year-old who gave birth in 2009, we had historical CPS data starting after infancy, whereas for a 19-year-old we only had historical data beginning at age 8. Given that the rates of CPS involvement are highest during the first few years of life, the true rate of earlier maternal reports, substantiations, and foster care placements among adolescents giving birth in Los Angeles County is undoubtedly higher.[11]

Variations in past CPS involvement were observed across most sociodemographic and health covariates. Although differences by maternal age at birth may be an artifact of the historical windows of available CPS records (i.e., we had more years of CPS records for 12- to 16-year-olds than for older adolescent mothers), notable variations by race/ethnicity are consistent with disparities documented in other studies of CPS involvement.[11,12]

For a 12-year-old who gave birth in 2009, we had historical CPS data starting after infancy.

In reference to the continuing public health burden of teen birth rates in the United States (estimated at $11 billion annually[13]), it was recently noted that "one explanation for the persistently high US birth rate is that there are risk factors for teen pregnancy and childbirth that are not addressed in current prevention efforts."[9] Documenting the prevalence of past abuse and neglect among adolescents who give birth and understanding its relationship to teen pregnancy and birth rates is critical to the development of informed prevention programs. Additionally, recognizing that a history of maltreatment characterizes many adolescent mothers may be relevant to the development of interventions that protect against abuse and neglect in the next generation.

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California's Most Vulnerable Parents
Culmulative Teen Birth Rates among Girls in Foster Care at Age 17

Vol 1-2. Cumulative Teen Birth Rates among Girls in Foster Care at Age 17

This analysis generates population-level estimates of the incidence of first and repeat births among girls in foster care. Using the full population of girls in foster care at age 17 between 2003 and 2007, we computed the cumulative percentage and characteristics of those who had a first or repeat birth by different ages. Findings document that more than 1 in 4 girls in foster care at age 17 gave birth during their teens; among girls with a first birth before age 18, nearly 40% went on to have a second teen birth.

INTRODUCTION

Teen birth rates in the United States have dropped dramatically and steadily during the last two decades, from 61.8 per 1,000 girls aged 15–19 years in 1991 to 34.2 per 1,000 in 2010.[1] Since 2007, decreases in the teen birth rate have accelerated and preliminary data suggest that between 2010 and 2011, the rate was further reduced by 8%.[2] Even in 2011, however, roughly 1 in 12 births was to a mother between the ages of 15 and 19. Furthermore, data indicate that roughly 18% of all births to teen mothers are repeat births.[2]

Despite a declining teen birth rate, the topic continues to garner significant attention and resources because teen births are correlated with a range of poor outcomes for both young mothers and children.[3-5] Although rigorous research increasingly points to economic disadvantage as a cause as much as a consequence of teen motherhood,[6-10] regardless of the direction, consequences are profound for children.[11] Pregnant teens often receive inadequate prenatal care and infants face a heightened risk of adverse birth outcomes, including low birth weight, preterm delivery, and infant mortality.[12,13] Children of teen mothers exhibit poorer cognitive and behavioral outcomes,[14] as well as significantly higher rates of abuse and neglect.[15,16] Longer term effects of being born to a teen mother include an increased likelihood of incarceration, adolescent pregnancy, and homelessness.[17,18]

Research suggests that young women in foster care are at high risk of early sexual debut, pregnancy, and giving birth during their teenage years and shortly thereafter.[19-21] This heightened risk aligns with literature documenting the socioeconomically disadvantaged backgrounds common among teens who give birth,[8] as well as national data that identifies a heightened rate of teen births among girls not residing with biological parents.[22] Children who are in foster care are overwhelmingly from poor families. Yet, there have been limited data available with which to calculate the rates of first and repeat births among girls placed in foster care, or to examine differences in rates based on foster care placement experiences. Foster care case management systems tend to focus on a narrow set of mandated fields that have

Research suggests that young women in foster care are at high risk of early sexual debut, pregnancy, and giving birth during their teenage years and shortly thereafter.

the most immediate relevance to the greatest number of cases. As such, information concerning pregnancies and births is often not entered, even though these data may be of critical importance to services and case planning for transition-age youth in foster care. Pregnancy and birth data are also relevant to broader program and policy development, particularly given the passage of the Fostering Connection to Success and Increasing Adoption Act of 2008,[23] which allows states to extend foster care to non-minor dependents. Most jurisdictions have limited data to assess how this legislation may change the nature of needed services and supports with what is expected to be an increase in the number of parenting youth in the foster care system.

OBJECTIVE

The current limitations of child protective service data for tracking births necessitate the use of alternative data sources. In this study, we use CPS records matched to birth records to produce a population-level, longitudinal examination of the incidence of first and repeat births among girls in foster care at age 17. Our objective was to generate new epidemiological data that would allow us to characterize the rates of first and repeat births for a population of girls in foster care.

METHODS

DATA SOURCES

This analysis was based on a dataset constructed by linking CPS records to vital birth records for the state of California. Child protection records were available through a university–agency data collaboration with the California Department of Social Services; vital birth records were obtained from the California Department of Public Health. These two data sources were linked using probabilistic matching software. Potential record pairs were generated based on a combination of personal identifiers common to both files. A clerical review was conducted to establish score thresholds for assigning each record pair as either a match or non-match. All uncertain pairs falling between these two score thresholds were manually reviewed and assigned a match status. The linkage of CPS and birth records for this project was approved by both state and university committees for the protection of human subjects and was reviewed and endorsed by California's Vital Statistics Advisory Committee.

After records were matched, we created a dataset consisting of the full population of girls who were age 17 and in a child welfare-supervised foster care placement between 2003 and 2007. By aggregating data for years with uncensored birth observations through the conclusion of the teen years (i.e., births before age 20), we obtained an adequately sized base population from which we could examine correlates of first and repeat births. Additionally, through the inclusion of all girls who were 17 and in foster care during this period, we avoided any potential biases that may operate via unrepresentative point-in-time or exit cohort samples.[25]

ANALYSIS

Using these aggregated data, we calculated descriptive statistics for the full population of 17-year-old girls in foster care during this period and used birth record information to compute the cumulative rate of first births before age 18 and age 20. We report covariate differences in first-birth rates as crude risk ratios (RRs) bounded by 95% confidence intervals (CI) with accompanying p-values. We chose to focus on these age cutoffs because births before age 18 provide an estimate of how many girls gave birth before transitioning into adulthood (and, at least historically, out of the foster care system). The cumulative rate of first births occurring before age 20 reflects the percentage of this foster youth population who had given birth during their teens. We additionally computed rates of repeat teen births for girls who had a first birth before age 18 or 19. We excluded from our repeat teen birth analysis girls who had a first birth only after their 19th birthday as, almost by definition, a repeat teen birth could not have occurred.

VARIABLES

All covariates were coded based on information derived from administrative CPS records. Youth were coded into one of four mutually exclusive racial/ethnic groups based on primary race and a Hispanic ethnicity indicator (White, Black, Latina/Hispanic, other/missing). The "other/missing" group included youth who were Asian, Native American, Pacific Islander, or for whom race/ethnicity information was missing. The small number of youth in each of these subgroups, as well as consistently low rates of birth, prevented further stratifications. Removal reason was coded based on the maltreatment type corresponding to the placement episode at age 17 (neglect, physical abuse, sexual abuse, other/missing). Episode length was coded based on the length of the placement episode (< 12 months, 12–35 months, 36-59 months, ≥ 60 months). Placement count captured the number of placements during the episode (1 placement, 2–3 placements, 4+ placements). Finally, we

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also examined the last placement type of the episode (kinship foster home, non-kin foster home, congregate care, guardian/other) and the final exit from this episode (emancipation, reunification, adoption/guardianship, runaway, other). The "other" category for final exit type was defined as discharges to other institutional settings (e.g., hospitalization, incarceration).

It should be noted that although we report p-values in our unadjusted examinations of covariates, the large size of our population meant that even modest differences emerged as significant. Therefore, we focus our discussions on those findings in which the magnitude of group differences was notable and substantively meaningful. We examined placement-related covariates in an effort to identify correlates of first and repeat births before ages 18 and 20. There were undoubtedly strong selection effects that we were unable to address in this descriptive study. As such, it would be inappropriate to infer any causal relationships between covariates and birth rates.

RESULTS

FIRST BIRTHS BY AGE

Figure 1 depicts the cumulative percentage of girls who were age 17 and in foster care between 2003 and 2007 and had a first birth before age 18, 19, and 20. Of the 6,749 girls in our population, a total of 11.5% (n = 777) had given birth before age 18.

More than 1 in 4 girls in foster care at age 17 had given birth at least once before age 20.

The cumulative percentage of girls with a first birth before age 19 was 19.0% (n = 1,281). By the end of the teen years, 27.5% (n = 1,856)—or more than 1 in 4 girls in foster care at age 17—had given birth at least once. Although not shown, the cumulative percentage of girls who had given birth before age 21 was 34.3%.

FIGURE 1

Cumulative Percentage of Girls in a Los Angeles County Foster Care Placement at Age 17 Who Had a First Birth as a Teen, 2003-2007
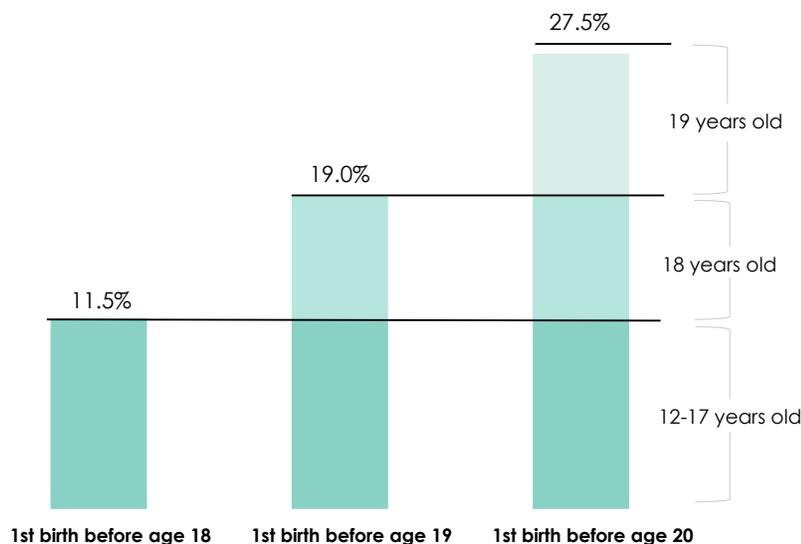
Table 1 presents the cumulative percentages of first teen births before ages 18 and 20 by race/ethnicity, as well as foster care placement covariates. Rates of first births were highest among Latina youth at both age cutoffs. The birth rate among Latinas who were in foster care at age 17 (15.5%) was more than twice the rate of their White counterparts (6.4%) before age 18 (RR = 2.42; 95% CI = 1.84–3.16). Although somewhat attenuated, the birth rate for Latinas remained significantly higher than the rate for White teens when all first births before age 20 were examined (RR = 1.74; 95% CI = 1.50–2.01). Among Black teens in our population, 9.6% gave birth before age 18; the rate was 24.4% when all births before age 20 were counted.

Rates of first births were highest among Latina youth.

Birth rates before age 18 varied based on the most recent removal reason. The birth rates of youth removed for neglect (12.5%) were significantly higher than those removed for physical abuse (9.7%) and other/missing maltreatment information (9.8%), but not statistically different than the rate associated with a removal for sexual abuse (10.5%). By age 20, birth rate differences only emerged between neglect compared to other/missing maltreatment.

Across both age thresholds, birth rates were lower among those girls whose episodes had lasted 5 years or longer (≥ 60 months) relative to youth with shorter episodes. It is also worth noting that a continuous foster care placement episode of 60 months or more was the most frequently observed episode length for girls in our population (51.4%). Among girls who had experienced four or more placements during their episode, first birth rates were significantly higher than the rates observed for girls who had been in only 1 to 3 placements. Birth rates before ages 18 and 20 were highest among the 14.9% of youth whose last placement during the episode was in a congregate care setting (20.7% and 37.5%, respectively), whereas percentages were notably lower among youth in guardian/other placements (4.9% and 15.6%, respectively). No significant birth rate differences at either age cutoff emerged for youth in non-kinship foster homes compared to those in kinship care.

Overall, 70.7% of girls turned age 18 while still in care and therefore exited via via emancipation (data were pre-

AB12). Another 15.1% reunified, 4.5% exited to adoption or guardianship, 5.0% were coded as runaways, and 4.8% had exits coded as "other" (e.g., incarcerated, hospitalized). Before age 18 and relative to youth who emancipated, a significantly lower rate of teen birth was observed among those who exited to adoption or guardianship (RR = 0.53; 95% CI = 0.34–0.84). When all births before age 20 were considered, first birth rates were 26% higher among girls who exited to reunification (RR = 1.26; 95% CI = 1.14–1.39) and 28% higher among those who had run away (RR = 1.28; 95% CI = 1.10–1.50) compared to the birth rate of those who had emancipated. Youth who exited to adoption or guardianship maintained a significantly lower teen birth rate (RR = 0.64; 95% CI = 0.50–0.82).

Table 2 features youth who had a first teen birth before age 18 or 19 and reports the rates of repeat teen births by covariates and age at first birth. As previously reported, 1,856 (27.5%) girls in foster care at age 17 gave birth for the first time before age 20. Yet, many of these youth first gave birth at age 19 and therefore, almost by definition, could not have a repeat teen birth. Therefore, in contrast to national statistics concerning repeat teen births,[26] we restricted our examination of repeat births to girls whose first birth occurred before ages 18 or 19.

Among girls in foster care who had a first birth before age 18, 38.7% had a repeat teen birth.

Not surprisingly, the overall rate of repeat births was higher among girls with a first birth before age 18 (38.7%) than for the larger population of youth who had a first birth at any point before age 19 (29.9%). Among girls with a first birth before age 18, no statistically significant variations in repeat teen birth rates emerged. When our examination was extended to include all youth with a first birth before age 19, only a single covariate emerged with significantly disparate rates of repeat teen births. The rate of repeat births observed for girls whose last placement was in either a non-kin foster home or a congregate care setting was roughly 30% greater than the rate among those placed with kin (non-kin foster home: RR = 1.32; 95% CI = 1.07–1.62; congregate care: RR = 1.31; 95% CI 1.04–1.66).

TABLE 1

Descriptive Characteristics of Girls in a Los Angeles County Foster Care Placement at Age 17: First Birth Rates Before Age 18 and Before Age 20 (per 100), Crude Risk Ratios, and 95% Confidence Intervals, 2003–2007

	In Care age 17		First Birth Before Age 18 (vs. no birth before age 18)				First Birth Before Age 20 (vs. no birth before age 20)			
	2003-2007		births	rate	crude risk ratios		births	rate	crude risk ratios	
	N	col %	n	per 100	RR	(95% CI)	n	per 100	RR	(95% CI)
Total	6,749	100.0%	777	11.5	--	--	1,856	27.5	--	--
Race/Ethnicity										
White	856	12.7%	55	6.4	Ref.	--	167	19.5	Ref.	--
Black	3,002	44.5%	289	9.6	1.50**	(1.13, 1.98)	733	24.4	1.25**	(1.08, 1.45)
Latina	2,726	40.4%	423	15.5	2.42***	(1.84, 3.16)	925	33.9	1.74***	(1.50, 2.01)
Other/Missing	165	2.4%	10	6.1	0.87	(0.44, 1.72)	31	18.8	0.96	(0.67, 1.36)
Removal Reason										
Neglect	4,200	62.2%	525	12.5	Ref.	--	1,196	28.5	Ref.	--
Physical Abuse	805	11.9%	78	9.7	0.78*	(0.62, 0.97)	205	25.5	0.89	(0.79, 1.02)
Sexual Abuse	446	6.6%	47	10.5	0.84	(0.64, 1.12)	134	30.0	1.06	(0.91, 1.23)
Other/Missing	1,298	19.2%	127	9.8	0.78**	(0.65, 0.94)	321	24.7	0.87**	(0.78, 0.97)
Episode Length										
≥ 60 months	3,414	51.4%	287	8.4	Ref.	--	787	23.1	Ref.	--
36-59 months	975	14.7%	138	14.2	1.68***	(1.39, 2.04)	291	29.9	1.29***	(1.16, 1.45)
12-35 months	1,450	21.8%	231	15.9	1.90***	(1.61, 2.23)	492	33.9	1.47***	(1.34, 1.62)
< 12 months	804	12.1%	113	14.1	1.67***	(1.36, 2.05)	267	33.2	1.44***	(1.28, 1.62)
Placement Count										
1 placement	1,563	23.2%	146	9.3	Ref.	--	366	23.4	Ref.	--
2-3 placements	2,085	30.9%	194	9.3	1.00	(0.81, 1.22)	504	24.2	1.03	(0.92, 1.16)
4+ placements	3,101	46.0%	437	14.1	1.51***	(1.26, 1.80)	986	31.8	1.36***	(1.22, 1.51)
Last Placement Type										
Kinship	2,286	33.9%	260	11.4	Ref.	--	619	27.1	Ref.	--
Non-kin	2,431	36.0%	269	11.1	0.97	(0.83, 1.14)	714	29.4	1.08	(0.99, 1.19)
Congregate Care	942	14.0%	195	20.7	1.82***	(1.54, 2.16)	353	37.5	1.38***	(1.24, 1.54)
Guardian/Other	659	16.2%	53	4.9	0.43***	(0.32, 0.57)	170	15.6	0.58***	(0.49, 0.67)
Final Exit										
Emancipation	4,772	70.7%	540	11.3	Ref.	--	1,270	26.6	Ref.	--
Reunification	1,018	15.1%	138	13.6	1.20*	(1.01, 1.43)	341	33.5	1.26***	(1.14, 1.39)
Adoption/Guard.	300	4.5%	18	6.0	0.53**	(0.34, 0.84)	51	17.0	0.64**	(0.50, 0.82)
Runaway	334	5.0%	49	14.7	1.30	(0.99, 1.70)	114	34.1	1.28**	(1.10, 1.50)
Other	325	4.8%	32	9.9	0.87	(0.62, 1.22)	80	24.6	0.92	(0.76, 1.12)

Notes: Summed counts may not equal column totals due to missing values for some variables.
Ref = reference group; RR = risk ratio; CI = confidence interval; Guard = guardianship. *p < .05; **p < .01; ***p < .001

TABLE 2

Repeat Birth Rates (per 100 first births) by Age at First Teen Birth Among Girls in a Los Angeles County Foster Care Placement at Age 17 in Los Angeles, 2003–2007

| | Repeat Teen Birth *(first birth before age 18; N=777)* | | | | Repeat Teen Birth *(first birth before age 19, N=1,281)* | | | |
| | repeat births | | crude risk ratios | | repeat births | | crude risk ratios | |
	n	rate per 100	RR	(95% CI)	*n*	rate per 100	RR	(95% CI)
Total	301	38.7	--	--	383	29.9	--	--
Race/Ethnicity								
White	19	34.6	Ref.	--	25	23.4	Ref.	--
Black	102	35.3	1.02	(0.69, 1.52)	139	27.8	1.19	(0.82, 1.72)
Latina	176	41.6	1.20	(0.82, 1.76)	212	32.6	1.39	(0.97, 2.00)
Removal Reason								
Neglect	198	37.7	Ref.	--	252	29.7	Ref.	--
Physical Abuse	36	46.2	1.22	(0.94, 1.59)	47	36.7	1.23	(0.96, 1.59)
Sexual Abuse	19	40.4	1.07	(0.74, 1.54)	25	28.4	0.96	(0.68, 1.35)
Other/Missing	48	37.8	1.00	(0.78, 1.29)	59	27.2	0.91	(0.72, 1.16)
Episode Length								
≥ 60 months	107	37.3	Ref.	--	141	28.1	Ref.	--
36-59 months	58	42.0	1.13	(0.86, 1.45)	71	33.2	1.18	(0.93, 1.50)
12-35 months	89	38.5	1.03	(0.83, 1.29)	105	29.8	1.06	(0.86, 1.31)
< 12 months	47	41.6	1.12	(0.88, 1.44)	65	32.2	1.15	(0.89, 1.46)
Placement Count								
1 placement	52	35.6	Ref.	--	72	28.0	Ref.	--
2-3 placements	78	40.2	1.13	(0.86, 1.49)	95	28.5	1.01	(0.79, 1.32)
4+ placements	171	39.1	1.10	(0.86, 1.41)	216	31.3	1.12	(0.89, 1.40)
Last Placement Type								
Kinship	93	35.8	Ref.	--	109	25.5	Ref.	--
Non-kin	113	42.0	1.17	(0.94, 1.46)	160	33.6	1.32**	(1.07, 1.62)
Congregate Care	78	40.0	1.12	(0.88, 1.42))	91	33.5	1.31*	(1.04, 1.66)
Guardian/Other	17	32.1	0.90	(0.59, 1.37)	23	21.9	0.86	(0.58, 1.28)
Final Exit								
Emancipation	209	38.7	Ref.	--	262	29.9	Ref.	--
Reunification	52	37.7	0.97	(0.77, 1.23)	66	27.5	0.92	(0.73, 1.15)
Runaway	17	34.7	0.90	(0.60, 1.34)	25	31.7	1.06	(0.75, 1.48)
Other	17	53.1	1.37	(0.97, 1.93)	22	38.6	1.29	(0.92, 1.82)

Notes: Summed counts may not equal column totals due to missing values for some variables.

Ref = reference group; RR = risk ratio; CI = confidence interval.

Categories were suppressed from findings due to small cell sizes and unstable estimates: (1) other/missing from race/ethnicity; and (2) adoption/guardianship from final exit. *p < .05; **p < .01; ***p < .001

DISCUSSION

SUMMARY

In this study, we developed population-level, longitudinal estimates of first and repeat births among girls in foster care at age 17 in Los Angeles County. Using CPS records linked to birth records, we identified the full population of girls in foster care at age 17 between 2003 and 2007. We used this population of girls to characterize variations in the rates of first and repeat births based on race/ethnicity, placement-related covariates, and age at first birth. Data from these analyses indicate that in Los Angeles County, more than 1 in 4 girls in foster care at age 17 gave birth as a teen. Among girls with a first teen birth before age 18, more than 1 in 3 gave birth to a second child before age 20.

Among girls with a first teen birth before age 18, more than 1 in 3 gave birth to a second child before age 20.

CHARACTERISTIC BIRTH RATE DIFFERENCES

Significant variations in teen birth rates emerged across several covariates. Rates of first births by race/ethnicity directionally aligned with general population state and national statistics: both Black and Latina youth had significantly heightened rates of first births relative to White youth in foster care. Youth removed because of physical abuse had lower first birth rates before age 18 than youth removed for reasons of neglect, yet rates were statistically equivalent when all births before age 20 were considered. This finding suggests that the relationship between removal type and the birth rate observed before age 18 may be due to a more general designation of pregnant or already parenting youth entering foster care as neglected. It is also important to note that our coding of removal type did not capture lifetime exposure to various forms of reported or substantiated maltreatment. Rather, it merely reflected the most proximate maltreatment type for the episode in which we identified 17-years-olds who were in foster care.

Data from this analysis documented a relationship between the number of placements and rates of first births: the highest birth rates were observed among youth who had four or more placements during the observed foster care episode – and nearly half of our population fell

in this group (46.0%). Although this finding is consistent with research linking placement instability to various behavioral problems and adverse outcomes,[27,28] it is unclear whether our finding is: (1) because of placement moves that occurred as a result of pregnancy or a birth, (2) a reflection of high-risk behaviors associated with both teen births and placement disruptions, or (3) causal in nature.

These data suggest that children entering a new foster care episode during their teens may be a particularly vulnerable subpopulation.

Variations by episode length produced some of the most striking differences in birth rates. Girls who had been in foster care episodes lasting 60 months or more (and who therefore entered foster care at or before age 12) had significantly lower rates of first births. Although it would be inappropriate to draw any causal conclusions for the reasons noted above, these data suggest that children entering a new foster care episode during their teens may be a particularly vulnerable subpopulation. Additionally, notwithstanding the likely adverse selection of already pregnant or parenting teens into foster care (which would inflate the rates of first births among youth in shorter episodes), these data still indicate that teens in long-term episodes have lower teen birth rates overall, and that for some children there may be benefits accrued through the stability implicit in longer-term foster care (e.g., children placed in long-term guardianship or kin placements). Future research should provide a more nuanced and fully longitudinal examination of foster care episode length, number of placements, and teen birth rates.

Finally, we also stratified birth rates by two placement-related covariates frequently examined in the foster care literature: placement type and final exit. Birth rate findings across these two variables were largely consistent and directionally aligned with expected birth rate differences. Although rates of first birth were statistically equivalent for kinship and non-kinship foster placements, teens in congregate care settings had significantly higher rates of birth whereas teens in guardianship placements had lower rates. As noted earlier and true of other covariates, it is unknown if these relationships are a manifestation

of selection effects or reflect causal relationships. Consistent with the lower rates of birth among teens whose last placement was coded as guardianship, teens who exited to adoption/guardianship had the lowest rates of first births. Relative to teens emancipating from foster care, the cumulative rate of first births before age 20 was significantly higher among teens who reunified and whose last exit was coded as a runaway.

Few differences emerged in rates of repeat teen births among those girls with a first birth before age 18 or 19. In fact, the most notable finding was the high rate of repeat teen births overall. Although only 11.5% of girls in foster care at age 17 had given a first birth before age 18, nearly 4 in 10 of these teens gave birth a second time before age 20. The rate of repeat teen births among those with a first birth before age 19 was roughly 3 in 10.

ALIGNMENT WITH OTHER RESEARCH

Few comparable longitudinal statistics of first or repeat birth rates are available, either for the adolescent population at large or for girls in foster care. Published state and national birth rate statistics for the general population are single-year incident rates reflecting the number of girls who were age 15–19 and gave birth.[2] These estimates, however, fail to capture the cumulative number or percentage of girls who had a first or repeat birth during their teen years. The closest birth rate we identified was found in a report based on the 2006–2010 National Survey of Family Growth (NSFG), a nationally representative survey examining sexual activity, contraceptive use, and childbearing in the United States.[22] Using a life table methodology, researchers estimated the probability of a first birth before age 18 at 8% and a first birth before age 20 at 18%. In our foster care population, we found that 11.5% and 27.5% of girls in foster care at age 17 had a first birth before age 18 and 20, respectively.

Although our estimate of first births is higher, it is important to keep in mind that the foster care population is a distinct subset of the overall population, composed predominantly of children and adolescents from families experiencing high and often chronic levels of poverty[29] and typically residing in impoverished neighborhoods[30] in which the economic calculus for delaying motherhood may be very different than other settings.[8] Comparisons between foster care and general population youth are

inevitably confounded by socioeconomic factors.[31] Underscoring the salience of these factors, when the NSFG data were disaggregated into subpopulations more sociodemographically analogous to youth in foster care, the probability of a teen birth among adolescents who were themselves born to teen mothers was estimated to be 13% (before age 18) and 29% (before age 20), higher than the rates of our foster care population.[22] Among adolescents in the NSFG whose mothers had not earned a high school diploma or GED, the probability of a teen birth before age 18 and 20 was 18% and 37%, respectively. Again, these estimated birth rates are higher than we found for our population of girls in foster care at age 17. Despite widespread assumptions to the contrary, data from the present study do not necessarily indicate a heightened teen birth rate among adolescents in foster care compared to socioeconomically similar adolescents in the community.

Our cumulative teen birth rates can also be compared to those from the Midwest Evaluation study,[20] which longitudinally followed a sample of youth who were in foster care at age 17 (n = 732) in Wisconsin, Illinois, and Iowa. Our estimates of the cumulative percentage of girls who had given birth before age 20 are slightly

> Despite widespread assumptions to the contrary, data from the present study do not necessarily indicate a heightened teen birth rate among adolescents in foster care compared to socioeconomically similar adolescents in the community.

lower, but very close to those reported in the Midwest study.[32,33] In the Midwest study, 31.3% of girls in the sample were parenting at the first follow-up interview (when most girls were age 19) compared to our estimates of 27.5% (LA) and 28.1% (CA) before age 20. The two estimates are strikingly similar given that significant variations emerge in overall teen birth rates by race and geography. The highest birth rates for Black teens have been observed in the upper Midwest,[34] and more than 50% of the Midwest foster care sample was Black.[20] In contrast, California has one of the lowest teen birth rates in the country, particularly among Latinas.[34] Yet, it appears that dynamics contributing to population-level

disparities in teen birth rates may operate differently among youth in foster care. Although our estimate may provide a slight undercount due to births occurring outside of California (our data were based on state birth records) and from missed matches between CPS and birth records, the alignment between the present study and the Midwest study help to validate both the record linkages underlying this analysis and the generalizability of the foster care sample used in the Midwest study.

CONCLUSION

Monitoring the incidence of first and repeat births among girls currently and formerly in foster care is critical to evaluating the efficacy of pregnancy prevention efforts and determining the nature of services that are needed for young mothers and children. These epidemiological data are even more important given recent federal legislation which lays the groundwork for states to extend foster care to nonminor dependents age 18 and over. Data from the present study indicate that a relatively small share (roughly 1 in 9) of all 17 year old girls in foster care have given birth before their 18th birthday, the traditional age at which an exit from foster care would have occurred. Yet by the end of their teens, data from Los Angeles (and analogous data from California) suggest that more than 1 in 4 will be parenting (and upon exit at age 21 it will be 1 in 3). The extension of foster care to youth over the age of 18 means that the nature of the state's parenting obligations will expand and will increasingly include the next generation of children. Although current birth rate patterns do not necessarily provide a sound counterfactual for the future, data from the present study highlight the need for expanded data and rigorous research concerning pregnant and parenting transition-age foster youth.

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California's Most Vulnerable Parents
Adolescent Mothers and Intergenerational Child Protective Service Involvement

Vol 1-3. Adolescent Mothers and Intergenerational Child Protective Service Involvement

This analysis generated the first population-based estimates of the transmission of abuse and neglect across generations using linked birth and child protection records. A maternal history of alleged or substantiated maltreatment emerged as the strongest predictor of offspring maltreatment by age 5, after adjusting for other risks. These data highlight the potential for targeting prevention and early intervention services to adolescent mothers with histories of abuse or neglect.

INTRODUCTION

The abuse and neglect of children is a pervasive and consequential public health issue associated with both short- and longer-term adversities. Maltreatment during childhood and adolescence has been linked to future mental health disorders,[1,2] alcohol and drug abuse,[3-5] poor physical health,[6-9] delinquency and adult criminality,[10,11] low educational and economic attainment,[10,12,13] and early pregnancy.[14] Research also suggests that a paren-

> No study to date has featured a population-level, epidemiological examination of the intergenerational transmission of maltreatment.

tal history of maltreatment has consequences for children, with heightened rates of abuse and neglect often observed among the offspring of maltreated parents.[15-21] Although it seems reasonable to conclude that parental experiences of abuse and neglect during childhood and adolescence directly and indirectly contribute to a heightened risk of maltreatment in the next generation, the evidentiary basis for this claim is quite weak.

As concluded in a recent systematic examination of the intergenerational maltreatment literature[22] and consistent with findings from an earlier Lancet review[23]: "there is insufficient scientific evidence to draw a definitive conclusion about the cycle of maltreatment hypothesis."[22(p45)] Although several rigorous, prospective studies have been conducted,[21,24] most research has suffered from a number of methodological limitations, including retrospective designs, short follow-up periods, and unrepresentative community samples.[22,23] No study to date has featured a population-level, epidemiological examination of the intergenerational transmission of maltreatment.

METHODS
DATA SOURCES

This study utilized a population-based longitudinal dataset constructed by linking vital birth records from Los Angeles County to statewide CPS records for both adolescent mothers and their children. Vital birth records from 2006 and 2007 were used to identify all primiparous (first-time) mothers who were 15–19 years of age. Personally identifiable maternal data from the birth record were used to match these adolescent mothers to historical CPS records from the state's administrative data system. In a separate data linkage, personally identifiable data for all infants born to these adolescent mothers were extracted and used to prospectively match infants to CPS records through each child's fifth birthday. Information concerning a maternal history of both reported and substantiated maltreatment victimization was then integrated with birth record and infant maltreatment data (see Figure 1).

OBJECTIVE

Adolescent mothers comprise a fairly homogenous, high-risk subset of new parents, thereby allowing a more direct exploration of the relationship between maternal and offspring maltreatment[25] while also providing an estimate of the transmission rate for a readily identifiable population to which prevention services can be targeted. In addition, infants and young children have the highest rates of maltreatment and are acutely vulnerable to its effects.[26-29] As such, examining the relationship between maternal exposure to abuse or neglect and children's risk during the critical period of infancy to 5 years of age may be particularly useful in the development of impactful prevention programs.

FIGURE 1

CPS Records Available for Teen Mother/Child Pairs from Births Occurring in Los Angeles County, 2006 or 2007
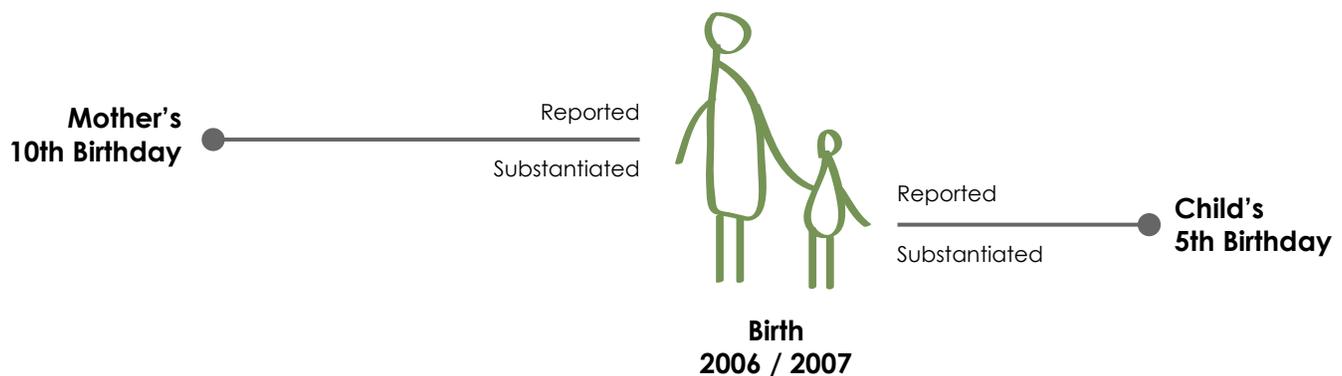
Notes: Records were organized longitudinally. For each child born to a teen mother in 2006 or 2007, we examined CPS records for the mother/child pair. Records of a maternal history of CPS involvement were examined back to each mother's 10th birthday. Records of children's involvement with CPS were available through each child's 5th birthday.

All record linkages were completed using probabilistic matching software.[30,31] A manual review of record pairs was conducted to establish lower- and upper-bound score thresholds for determining a pair of records to be a true match (i.e., all pairs falling above the upper-bound threshold) or false match (i.e., all pairs falling below the lower-bound threshold).[32] For record pairs falling between the lower-bound and upper-bound scores, a clerical review and manual assignment of match status was completed. This study received approval from both university and state committees for the protection of human subjects.

The records of 532 adolescents who were placed in out-of-home foster care on or after the estimated date of conception (2.1% of all adolescent first births in 2006 and 2007) were excluded to avoid the potential surveillance bias that may exist for mothers in foster care. The date of conception was estimated from medical information in birth records. The final dataset consisted of the full population of children born to primiparous adolescents 15–19 years in Los Angeles in 2006 and 2007 who were not in foster care after becoming pregnant (N = 24,767).

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DEPENDENT VARIABLES

Two dependent variables were separately coded and modeled. The first coded outcome was whether the child was reported for maltreatment between birth and age 5 (reported for maltreatment, not reported). Examining all reports is consistent with other recent examinations of intergenerational maltreatment[3,19] and informed by literature documenting high rates of re-reporting of initially unsubstantiated allegations[33] and comparably poor outcomes among children reported to CPS, regardless of whether the report was investigated or substantiated.[28,34] A narrower definition of maltreatment was also adopted

Examining all reports is consistent with other recent examinations of intergenerational maltreatment and informed by literature documenting high rates of re-reporting of initially unsubstantiated allegations.

by examining whether a child was substantiated as a victim of maltreatment before age 5 (substantiated for maltreatment, not substantiated). The reference group for the dichotomous measure of substantiation was not restricted to reported children; substantiated children were compared to all children who were not substantiated. In California, substantiation refers to an allegation of maltreatment determined by a CPS investigator to constitute child abuse or neglect based upon evidence that makes it more likely than not that child abuse or neglect occurred (Penal Code sections 11165.12, 11165.6).

INDEPENDENT VARIABLE

Adolescent mothers were categorized into one of three mutually exclusive groups: (1) no report; (2) reported as a possible victim of maltreatment but not substantiated; and (3) reported and substantiated for maltreatment. A maternal history of maltreatment was coded based on CPS reports received after the mother's 10th birthday and before the estimated date of conception. The analysis was restricted in this manner because California (and Los Angeles) transitioned to a new CPS data collection system in 1998 and complete maltreatment records were not available prior to this date. Maternal reports received after conception were excluded in an effort to establish a clear temporal association between maternal and child maltreatment.

COVARIATES

In an attempt to isolate the relationship between maternal maltreatment (both reported and substantiated) and a child's risk of abuse or neglect, adjustments were made for several potentially confounding covariates available in birth records. Maternal sociodemographic variables included maternal age at child's birth (15–16 years, 17–18 years, 19 years), maternal race/ethnicity (White, Black, Latina, Asian/Pacific Islander, Native American), and birth payment method (private, public). Adjustments were also made for pregnancy and birth-related information, including the trimester prenatal care was initiated (first, second, third, no care/missing), history of pregnancy terminations (none, prior terminations), and infant birth weight (< 2500g, ≥ 2500g).

The characteristics of all children born were described and then stratified into children reported to CPS as possible victims of maltreatment by age 5 (versus all children who were not reported) and those substantiated for maltreatment by age 5 (versus all children who were not substantiated). Variations in the rates of children reported and substantiated (per 100 children born) were assessed using X^2 tests. Multivariable Cox proportional hazard regression models were used to model the relationship between adolescent maternal maltreatment exposure and the rates at which their children were reported (Model 1) and substantiated (Model 2) as victims of maltreatment, after adjusting for other risk factors. In both models, time was measured as days from birth through the outcome of interest (i.e., first report or first substantiated report of maltreatment); observations were censored on the child's fifth birthday. Adjusted model estimates are reported as hazard ratios (HRs) with corresponding 95% confidence intervals (95% CI). HRs measure how often a particular event occurs over time in one group compared with a reference group. An HR of 1 indicates no difference in the incidence of the event between two groups over time, whereas an HR of 2, for example, means that the incidence of the event in one group is twice that of another group. Kaplan-Meier cumulative failure rates were also calculated by maternal maltreatment status. All analyses were conducted using StataSE version 12.[35]

RESULTS

DESCRIPTIVE FINDINGS

Table 1 reports the sociodemographic and pregnancy/birth-related characteristics of infants born to primiparous adolescent mothers in Los Angeles in 2006 and 2007. Among the 24,767 infants in our population, 25.6% were born to a mother who had been reported for maltreatment between age 10 and becoming pregnant (14.3% of mothers had an unsubstantiated report; 11.3% were substantiated). A relatively small percentage of infants (17.4%) were born to the youngest adolescent mothers (ages 15–16 years). More than 4 in 5 infants (82.5%) were born to a Latina mother, 10.1% to a Black mother, and 5.3% to a White mother. Public health insurance covered more than three quarters (78.9%) of births and 78.2% of mothers initiated prenatal care during the first trimester.

Overall, 20.6% children born (n = 5,113) were reported to CPS for abuse or neglect and 7.7% (n = 1,909) were substantiated as victims before age 5. Relative to children who had no contact with CPS by age 5, significant variations (p < .001) were observed in the distribution of reported and substantiated children across all sociodemographic and pregnancy/birth-related variables, except history of pregnancy terminations and birth payment method. The most pronounced variations in children's risk, however, emerged based on maternal maltreatment history. Among teen mothers who had not been reported as possible victims of maltreatment, 15.8% of their children were reported for maltreatment by age 5. In contrast, the corresponding rates of children reported among those born to a mother with an unsubstantiated or substantiated report were 30.7% and 39.8%, respectively (p < .001).

Among teen mothers who had not been reported as possible victims of maltreatment, 15.8% of their children were reported for maltreatment by age 5. In contrast, the corresponding rates of children reported among those born to a mother with an unsubstantiated or substantiated report were 30.7% and 39.8%.

When the more conservative substantiation definition of offspring maltreatment was examined, similarly large and graded disparities by maternal maltreatment were observed. The substantiation rate was 5.4% among children born to mothers with no alleged or substantiated maltreatment history, less than half the substantiation rate of children born to mothers with an unsubstantiated report of victimization (11.8%) and one third the rate of children born to mothers who had been substantiated as victims (18.0%). Figure 1 depicts the cumulative rate of children reported and substantiated for maltreatment between birth and age 5.

TABLE 1

Characteristics of Children born to Adolescents in Los Angeles County in 2006 and 2007 by Child Maltreatment Status at Age 5

	All Births N=24,767 (2006-2007)		Child Reported N=5,113 (vs. no report by age 5)			Child Substantiated N=1,909 (vs. no substantiation by age 5)		
	N	%	N	%	χ^2	N	%	χ^2
Maternal Maltreatment								
No report	18,424	74.4	2,910	15.8		990	5.4	
Unsubstantiated report	3,549	14.3	1,090	30.7	$p < .001$	417	11.8	$p < .001$
Substantiated report	2,794	11.3	1,113	39.8		502	18.0	
Maternal Age at Birth								
15–16 years	4,298	17.4	1,195	27.8		440	10.2	
17–18 years	11,824	47.7	2,444	20.7	$p < .001$	906	7.7	$p < .001$
19 years	8,645	34.9	1,474	17.1		563	6.5	
Race/Ethnicity								
White	1,306	5.3	378	28.9		142	10.9	
Black	2,490	10.1	851	34.2		333	13.4	
Latina	20,377	82.5	3,778	18.5	$p < .001$	1,387	6.8	$p < .001$
Asian/Pacific Islander	502	2.0	81	16.1		33	6.6	
Native American	38	0.2	13	34.2		7	18.4	
Birth Payment Method								
Private	5,200	21.1	1,072	20.6	$p = .962$	386	7.4	$p = .375$
Public	19,428	78.9	4,011	20.7		1,514	7.8	
Initiation of Prenatal Care								
First trimester	19,358	78.2	3,868	20.0		1,430	7.4	
Second trimester	4,282	17.3	966	22.6	$p < .001$	359	8.4	$p < .001$
Third trimester	763	3.1	174	22.8		68	8.9	
No care/missing	364	1.5	105	28.9		52	14.3	
Pregnancy Terminations								
None	23,801	96.1	4,897	20.6	$p = .179$	1,822	7.7	$p = .123$
Prior termination	966	3.9	216	22.4		87	9.0	
Infant Birth Weight								
Normal (≥ 2500g)	22,875	92.4	4,638	20.3	$p < .001$	1,706	7.5	$p < .001$
Low (< 2500g)	1,892	7.6	475	25.1		203	10.7	

Notes: "Births" column may not equal 100% due to rounding. χ^2 tests were used to compare the characteristics of children reported for maltreatment vs. children not reported and to compare the characteristics of children substantiated for maltreatment vs. children not substantiated.

FIGURE 2

Cumulative Rate of Children Born to Adolescent Mothers in Los Angeles County in 2006 or 2007 who were Reported and Substantiated for Maltreatment by Age 5, Stratified by Maternal History of Maltreatment
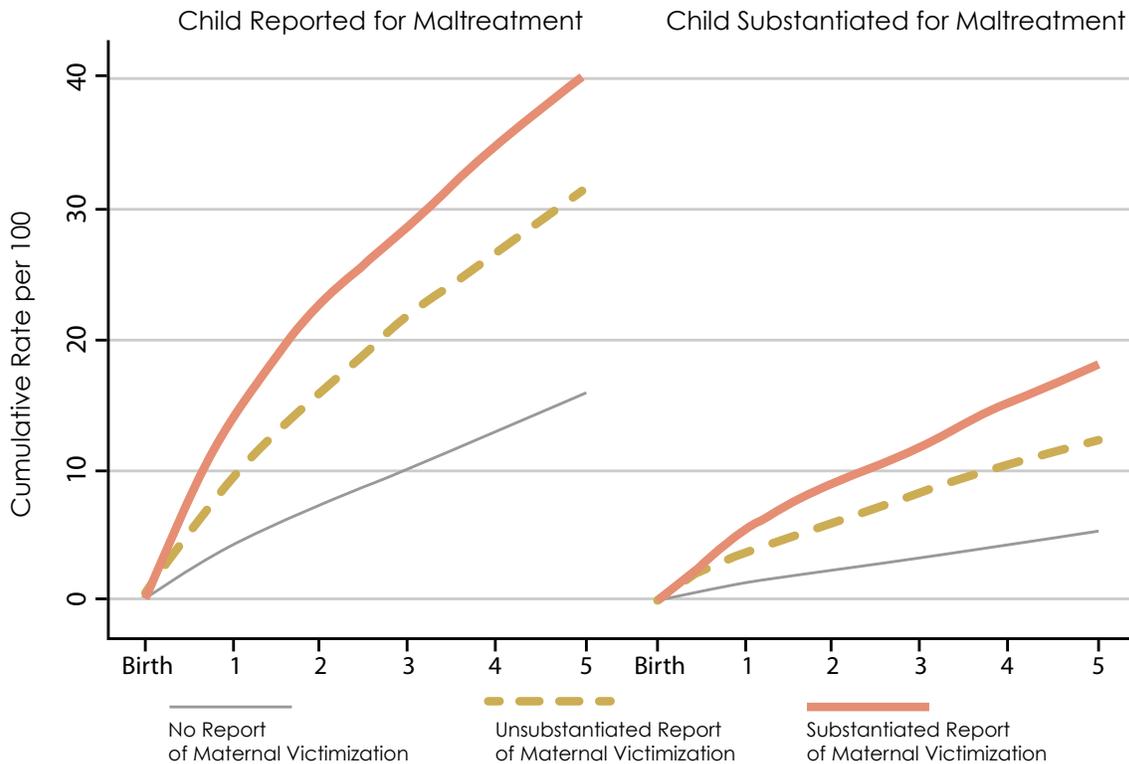
MULTIVARIABLE FINDINGS

Adjusted HRs and 95% CIs for reported (Model 1) and substantiated (Model 2) child maltreatment are presented in Table 2. After adjusting for other covariates, the rate of reported maltreatment among children born to mothers with an unsubstantiated maltreatment report was nearly twice that of children whose mothers had not been reported (HR: 1.96; 95% CI: 1.82, 2.10); children born to adolescent mothers who were substantiated victims of abuse or neglect had a rate of reported maltreatment that was more than 2.5 times as great (HR: 2.64; 95% CI: 2.46, 2.84).

When children's substantiation status was modeled, modestly stronger and similarly graded relationships emerged between maternal maltreatment exposure and offspring abuse or neglect. The rate of substantiation among children born to mothers with an unsubstantiated report of maltreatment was approximately twice that of children whose mothers had no CPS contact (HR: 2.10; 95% CI: 1.87, 2.35). Among children born to mothers substantiated as victims, the rate of substantiation was more than 3 times as great (HR: 3.19; 95% CI: 2.86, 3.57).

Several significant associations between other covariates and the rate at which children were reported and substantiated for maltreatment emerged in the adjusted models. Younger maternal age at birth was associated with a significantly increased rate of maltreatment. Relative to children born to White mothers, a lower rate of reported and substantiated maltreatment was observed for children born to Latina and Asian/Pacific Islander mothers. Finally, a heightened rate of reported and substantiated maltreatment emerged for children who were low birth weight or whose mothers did not receive prenatal care.

TABLE 2

Adjusted Risk of Reported and Substantiated Maltreatment by Age 5 among Children born in Los Angeles County to Adolescent Mothers in 2006 and 2007

	Model 1 Child Reported (vs. no report by age 5)		Model 2 Child Substantiated (vs. no substantiation by age 5)	
	Adj. HR	(95% CI)	Adj. HR	(95% CI)
Maternal Maltreatment				
No report	Ref.	--	Ref.	--
Unsubstantiated report	1.96***	(1.82, 2.10)	2.10***	(1.87, 2.35)
Substantiated report	2.64***	(2.46, 2.84)	3.19***	(2.86, 3.57)
Maternal Age at Birth				
15–16 years	1.73***	(1.60, 1.87)	1.53***	(1.34, 1.74)
17–18 years	1.21***	(1.14, 1.29)	1.14*	(1.03, 1.27)
19 years	Ref.	--	Ref.	--
Race/Ethnicity				
White	Ref.	--	Ref.	--
Black	1.07	(0.95, 1.21)	1.06	(0.87, 1.29)
Latina	0.63***	(0.56, 0.70)	0.67***	(0.56, 0.80)
Asian/Pacific Islander	0.57***	(0.45, 0.72)	0.67*	(0.46, 0.98)
Native American	1.02	(0.58, 1.77)	1.53	(0.72, 3.27)
Birth Payment Method				
Private	Ref.	--	Ref.	--
Public	1.09*	(1.02, 1.17)	1.13*	(1.01, 1.27)
Initiation of Prenatal Care				
First trimester	Ref.	--	Ref.	--
Second trimester	1.06	(0.99, 1.14)	1.07	(0.96, 1.21)
Third trimester	1.10	(0.94, 1.28)	1.16	(0.91, 1.49)
No care/missing	1.48***	(1.21, 1.82)	1.81***	(1.35, 2.43)
Pregnancy Terminations				
None	Ref.	--	Ref.	--
Prior termination	1.07	(0.93, 1.22)	1.13	(0.91, 1.40)
Infant Birth Weight				
Normal (≥ 2500g)	Ref.	--	Ref.	--
Low (< 2500g)	1.25***	(1.13, 1.37)	1.41***	(1.22, 1.63)

Notes: *p < .05; **p < .01; ***p < .001;

Ref = reference group; Adj = Adjusted; CPS = child protective services; HR = hazard ratio; CI = confidence interval

DISCUSSION

This population-level study documented a strong and significantly heightened rate of reported and substantiated abuse and neglect among children born to adolescent mothers with a history of CPS involvement. A maternal history of alleged or substantiated maltreatment emerged in these data as the strongest predictors of both reported and substantiated offspring maltreatment by age 5, even after adjusting for other risk factors. Although these findings are largely consistent with earlier research, this study is methodologically unique, overcoming many limitations noted in reviews of the intergenerational literature.[22,23]

First, this is the only study to examine the transmission of maltreatment across two generations using an entire population of births. No studies to date have provided a population-level, epidemiological estimate of maltreatment across generations.[22,23] Our findings document that roughly 1 in 4 adolescents who gave birth for the first time in 2006 or 2007 in Los Angeles had been reported to CPS as an alleged victim of abuse or neglect after age 10 and prior to becoming pregnant. Among children born to mothers with an unsubstantiated report, 30.7% were reported for maltreatment and 11.8% were substantiated as victims. The corresponding rates among children of

mothers with a substantiated report were even higher at 39.8 and 18.0%, respectively.

Second, this is the only study to examine intergenerational maltreatment dynamics among first-time adolescent mothers. Prior research suggests adolescence is an important contributor to offspring maltreatment risk,[16,36] and at least one intergenerational study found that maternal maltreatment starting or continuing into adolescence was a significant risk factor for next-generation maltreatment (whereas maltreatment in early childhood was not).[21] Further, a large body of research indicates that the onset of parenthood during adolescence is accompanied by a host of near- and longer-term adversities for both mothers and children.[37,38] Although our findings cannot be extended to nonadolescent populations, among children born to adolescent mothers, a recent history of maternal CPS involvement is a strong predictor of contact with CPS during the first 5 years of life.

Third, this is one of just a handful of studies[14,24] to use official CPS records to operationalize maltreatment for both mothers and children.[22] Data from the present study indicate that even among a high-risk population of new adolescent mothers, there are significant differences in children's maltreatment rates based on a mother's own history of maltreatment. This is notable because it highlights that existing administrative CPS records, although an imperfect measure of maternal maltreatment exposure, are useful for differentiating among high-risk births and may provide a means of more strategically targeting prevention services (e.g., prioritizing maltreated adolescents for home visitation services).

Finally, this research extends prior intergenerational work that similarly operationalized child maltreatment using all reports to CPS.[3,19] A significantly heightened rate of offspring maltreatment (both reported and substantiated) was documented not only for mothers with a substantiated report of maltreatment but also for those whose reports were unsubstantiated. These findings provide yet more empirical support for concluding that a report of maltreatment, even if not substantiated, is a meaningful signal of risk.[40]

LIMITATIONS

Although this large-scale, prospective, and longitudinal study overcomes many methodological shortcomings common to the larger body of intergenerational literature,[22] several limitations pertaining to the generalizability of findings and the nature of administrative data must be considered. Foremost, this analysis was restricted to an examination of the transmission of abuse or neglect among adolescent mothers with a recent report of maltreatment (after age 10). A large body of research documents that young women who enter into parenthood during adolescence have a unique profile.[41,42] The relationship between maternal maltreatment and offspring abuse or neglect may manifest very differently among women with a delayed first birth, or less proximate maltreatment exposure (i.e., occurring before the age of 10).

Relatedly, these data only capture the relationship between maternal maltreatment and children's risk of abuse or neglect between birth and age 5. At the time data were linked, administrative CPS records for children born in 2006 and 2007 were only available through 2012. Although this allowed an examination of child maltreatment during the period in which risk of abuse and neglect is highest,[26] findings reported in this study cannot be generalized to maltreatment during the entirety of childhood. Additionally, these data are from a single state and do not account for mothers reported as victims in other states before giving birth in Los Angeles or children born in Los Angeles and reported or substantiated for maltreatment outside of California.

CONCLUSIONS

With total lifetime costs associated with one year of confirmed cases of child maltreatment recently estimated at $124 billion,[43] investments in the prevention of childhood and adolescent maltreatment are increasingly recognized as critical to promoting health and well-being throughout the life course. The current study is the first to use population-level data to document that a history of CPS involvement for an adolescent mother is related

> Investments in the prevention of childhood and adolescent maltreatment are increasingly recognized as critical to promoting health and well-being throughout the life course.

to a significantly heightened risk of offspring maltreatment. These data highlight the potential for administrative data sources to be used to risk-stratify adolescent parent populations for targeted maltreatment prevention services. Findings also point to the salience of maternal maltreatment exposure to next-generation outcomes. Future research should explore intergenerational dynamics that may operate via maternal exposure to different types of maltreatment (e.g., neglect, physical abuse, sexual abuse)[18] and examine mediating pathways between maternal maltreatment and abuse or neglect in the next generation (e.g., substance use).[3,19]

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California's Most Vulnerable Parents
A Cross-Sectional Study of Birth Rate Trends among Girls in Foster Care

Vol 1-4. A Cross-Sectional Study of Birth Rate Trends among Girls in Foster Care

This study produces birth rate estimates for 15 to 17 year-old female youth who spent time in foster care between 2006 and 2010. Results indicate that although only a small number of female foster youth gave birth, the rate of childbearing among 15 to 17 year-old female foster youth was significantly higher than female youth in the general population of Los Angeles County. Comparisons with sociodemographically similar teens in the county were not possible. Female youth who were in foster care for shorter periods of time and experienced greater placement instability were more likely to give birth. Among girls who were in foster care and gave birth – roughly half became pregnant before entering care.

INTRODUCTION

Although the national birth rate for girls aged 15–19 fell to a historic low of 31 births per 1,000 in 2011,[1] teen birth rates in the United States remain high among industrialized countries[2] and teen parenting continues to be a significant public health problem.[3] Adolescent parenting is associated with diminished physical health,[4] higher incidence of depression,[5] and limited educational and vocational success.[6] Health, social, and educational chal-

> Because various prevention efforts have succeeded at reducing unintended pregnancies among adolescents in the general population, the target of prevention is now shifting toward particularly high-risk groups, including youth in foster care.

lenges are also well documented among children born to adolescent mothers.[7,8] Early childbearing is also associated with an elevated risk of maltreatment among children of adolescent mothers.[9,10]

Because various prevention efforts have succeeded at reducing unintended pregnancies among adolescents in the general population,[2] prevention efforts are now shifting toward particularly high-risk groups, including youth in foster care.[11,12] This targeting appears to be warranted as rates of pregnancy and birth among teens in or recently exited from foster care are substantially higher than in the general population.[13–17] Yet, current knowledge is limited by the absence of epidemiological data concerning birth rates for the full population of girls in foster care, birth rate trends over time, and foster care experiences that may be related to a heightened rate of birth. In this study, we linked foster care and vital birth record data to calculate and characterize annual birth rates for girls placed in foster care in LA County.

BACKGROUND

Adolescent childbearing is associated with various demographic and social characteristics[3,18] and disparities in teen birth rates are evident across both race and socioeconomic status.[19,20] In 2011, teenage mothers in the United States were more likely to be Black or Latina than White, although birth rates for Blacks and Latinas have declined more sharply during the last 20 years than have birth rates among White teens.[1] Adolescent mothers are also more likely to be from low-income families[21] and high-poverty neighborhoods.[22]

Adverse childhood experiences also contribute to higher rates of early parenting.[23] Physical abuse, especially when it occurs during preschool and elementary school, can increase the risk of childbearing during adolescence.[24-26] Sexual abuse that occurs during childhood and into adolescence has emerged as a risk factor for teenage pregnancy and childbearing.[27-29] A meta-analysis found that girls who experienced childhood sexual abuse had more than twice the odds of teenage pregnancy than those who did not.[30] Another study found that girls who experienced either childhood sexual abuse or neglect experienced higher rates of adolescent childbirth than their nonmaltreated counterparts.[31] Lastly, maltreatment that occurs during adolescence, particularly neglect, has been found to significantly affect the odds of teen pregnancy.[32]

Consistent with studies that have established a relationship between maltreatment and teen pregnancy and births, research has also suggested that girls in or exiting from foster care may be more likely to become pregnant and give birth as teens than those in the general population.[14-16,33] Dworsky and Courtney[14] found that half of the girls in their 3-state Midwest sample had been pregnant by age 19 compared to one fifth of a nationally representative sample of the general population. Additionally, approximately 32% of girls in foster care in this same Midwest sample reported that they had given birth before age 20.[13] In an analysis of foster youth in Maryland, the birth rate was calculated at 93 per 1,000, a rate 3 times higher than the state's overall teen birth rate.[16]

Research to date has been hampered by difficulties in measuring the number of births to girls in foster care; this limitation can be partially addressed through linkage of CPS data and vital birth records.

Findings from studies that have assessed rates of teen parenting among maltreated girls under the supervision of the child protective services (CPS) system have been mixed. One study found that among teen girls involved with CPS, 1 in 6 were either pregnant or parenting.[15] Another examined the risk of teenage childbearing among those on the margin of foster care placement and found that the birth rate among girls placed in foster care was significantly higher than for girls who remained at home with their families.[34] Other studies have found no statistical differences in the rate of teen pregnancy and births between maltreated girls who remained in their home and those placed in foster care.[35,36]

Mixed findings concerning teen pregnancy and birth rates among girls in foster care likely reflect geographic variations, secular trends, and different inclusionary criteria. Studies based on point-in-time estimates of girls in foster care who give birth fail to capture all girls who give birth in a single year because not all teen mothers remain in care while pregnant or after giving birth. Additionally, such estimates may miss adolescents who exit care just prior to giving birth or those who enter care just after giving birth. Surveys of a small but meaningful population of foster youths who reach the age of majority while still in care may also be potentially biased because many children, even adolescents, exit care for other reasons prior to emancipation.[37,38]

Research to date has been hampered by difficulties in measuring the number of births to youth in foster care; this limitation can be partially addressed through linkage of CPS data and vital birth records.[39] There have been no U.S.-based studies that have used population-based birth record data to measure the rate of childbearing among girls in foster care, nor any that have examined whether there are characteristic foster care experiences associated with rates of birth. The current study used linked data to estimate the annual incidence of births among girls who were placed in foster care in Los Angeles. The incidence of births was examined across time (2006–2010) and stratified by race/ethnicity and foster care placement variables.

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METHODS

DATA SOURCES

Child protective service records for girls in foster care in Los Angeles between 2006 and 2010 were extracted from California's child welfare case management system. CPS records were available through a longstanding data-sharing collaborative with the California Department of Social Services. Vital records capturing all births occurring in California between 2006 and 2010 were obtained from the California Department of Public Health. Personally identifiable maternal information from the birth records was extracted for all teen mothers who gave birth when they were 15–17 years of age. This information was used to match CPS and birth records to identify girls in foster care who gave birth.

Record linkages were completed using probabilistic matching software that established matches based on a combination of identifiers common to both data sources. Match status cut-points for designating a record pair as a match or nonmatch were determined through an extensive examination of linked records. All record pairs falling above the upper cut-point were automatically deemed a match; record pairs below the lower cut-point were deemed nonmatches. A clerical review of pairs falling between the lower and upper thresholds was used to assign the final match status for remaining record pairs.[40] The final dataset generated from these linkages included all girls 15–17 years of age in Los Angeles County's foster care system between 2006 and 2010 and documented who gave birth during each year. The linkage and analysis of these data fell under state and university institutional review board protocols and was reviewed by the California Vital Statistics Advisory Board.

RATES

To generate annual teen birth rates among girls in foster care, we specified a base population denominator that included all girls 15–17 years of age who were in an active foster care placement during each year between 2006 and 2010. Of those girls in foster care during a given year, the numerator included those who gave birth at any point during that same year. As such, 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 after exiting foster care; and (3) girls who gave birth during the year before entering care. Given the size of the base population of girls in foster care, we report a birth rate per 100.

For comparative purposes, an overall 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 county was estimated based on data available from the California Department of Finance.[41,42] 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[43] were derived from population data available in 2010, while in this study we use revised intercensal population estimates released in 2012.[41]

VARIABLES

To investigate variations in teen birth rates among girls in foster care, we stratified our data by race/ethnicity and four variables measuring placement-related experiences frequently encountered in the foster care literature and correlated with various outcomes: (1) episode length, (2) placement stability, (3) number of foster care episodes, and (4) placement type.[14,44-46]

Since girls could have had more than one episode in foster care in a given year, variables characterizing girls' foster care experiences were coded based on a defined focal episode. For the base population of girls in foster care (denominator), the last episode during the year was specified as the focal episode in care. 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 was calculated for our base population/denominator by subtracting the entry date for the focal foster care episode from the last day of placement if there was an exit from care, or the last day of the year if there was no exit. For our numerator of girls in foster care who gave birth during each year, the episode entry date was subtracted from either: (1) the date the youth 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. Episode

length was then coded as a four-level categorical variable (less than 12 months, 12–23 months, 24–59 months, and 60 months+).

Placement stability was also generated from information corresponding to the defined focal episode and was coded as a four-level categorical variable 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+)*.* As was true for episode length, the subset of girls who gave birth and then entered care was not examined by placement stability. We also constructed a dichotomous variable indicating whether 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, CPS records prior to this date were only available for girls who had an open placement record at the time of the new system conversion or entered thereafter. As such, this variable should be considered a conservative estimate of multiple episodes in care.

For the base population of girls in foster care, placement type was generated from the focal episode. 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). Our final category was comprised largely of guardian homes, with much smaller proportions of girls in pre-adoption placements or court and tribe-specified homes. We additionally produced general population and foster care birth rates stratified by race/ethnicity. We focused our analysis on the three largest racial/ethnic groups (Black, Latina, and White). We coded race/ethnicity based on first identified race and a Latino ethnicity indicator, as recorded in vital birth records (for the general population) or CPS records (for the foster care population).

We also examined foster care status at the estimated date of conception among girls who gave birth. The date of conception was calculated based on gestational age as recorded in the birth records. The estimated date of conception was then subtracted from the date the birth occurred. The resulting date was used to determine whether or not a girl who gave birth was in an active foster care placement when she became pregnant.

RESULTS

PLACEMENT CHARACTERISTICS

Table 1 presents annual teen birth rates (per 100) for 15- to 17-year-olds between 2006 and 2010. These teen birth rates were computed for girls: (1) in the general population of Los Angeles and (2) who were in foster care at some point during each year. For the population of girls in foster care at some point during the calendar year in which they gave birth, we provide further birth rate stratifications by placement-related variables.

On average, girls in foster care gave birth at marginally higher rates than adolescent girls in the general population (3.5 per 100 vs. 2.2 per 100). Although on a relative basis, the teen birth rate of girls in foster care was higher (59%), the actual count of girls in foster care who gave births was quite small; in any given year, no more than 4.0% of 15- to 17-year-old girls gave birth during the same year they were in foster care. Across the 5 years of data examined, general population teen birth rates declined consistently and substantially by nearly 23.5%, from 2.4 per 100 in 2006 to 1.8 in 2010. Birth rates among girls in foster care peaked in 2007 and then declined more modestly by about 12.1% through 2010.

Girls who experienced the greatest instability (9 or more placements) had far higher birth rates than those who experienced less instability.

Notable differences in birth rates for girls in foster care emerged across variables capturing placement-related experiences. A graded relationship between foster care episode length and birth rate was observed, with rates of birth higher among girls who had been in care for shorter periods of time. The birth rate of those in care for less than 12 months was more than twice the rate for those in care for 60 months or more. Additionally, birth rates among girls in foster care for longer periods of time (24 months or more) have decreased over time, while births to girls in placements for less than 12 months has increased by 18.1% between 2006 and 2010.

Placement stability was also related to the likelihood of giving birth: girls who experienced the greatest instability (9 or more placements) had far higher birth rates than those who experienced less instability. Birth rate differences by episode count were less consistent. Across years, there were few differences between girls in their

TABLE 1

Births to Girls Age 15-17 in a Los Angeles County Foster Care Placement During the Year: General Population Comparison, Average Birth Rate 2006–2010, Birth Rates by Year, and Distribution by Placement-Related Experiences

	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 (LA)	2.2	5,208	2.4	5,347	2.4	5,102	2.3	4,590	2.2	3,940	1.8
Foster Care During the Year	3.5	155	3.5	171	4.0	134	3.3	130	3.4	107	3.1
Episode Length											
Less than 12 months	4.1	35	3.4	57	5.4	42	3.9	39	3.6	41	4.1
12-23 months	2.6	20	3.0	21	3.2	12	2.0	13	2.1	16	2.6
24-59 months	2.5	27	3.5	23	2.8	19	2.2	16	1.9	13	1.8
60 months +	2.0	44	2.3	38	2.2	30	2.0	23	1.8	20	1.8
Placement Stability											
1-2 placements	2.5	39	2.0	58	3.0	41	2.2	45	2.6	38	2.4
3-4 placements	2.3	22	2.1	31	3.1	21	2.4	12	1.4	16	2.1
5-8 placements	2.7	29	3.3	24	2.8	19	2.4	19	2.5	16	2.4
9+ placements	4.7	36	6.5	26	4.9	22	4.5	15	3.1	20	4.4
Episodes in Foster Care											
First episode	3.3	88	3.3	104	3.9	84	3.3	69	2.8	66	2.9
Second episode +	3.8	67	3.8	67	4.0	50	3.3	61	4.4	41	3.3
Placement Type											
Kin Foster	3.3	54	3.8	61	4.6	33	2.9	23	2.3	24	2.6
Non-Kin Foster	4.4	60	3.9	71	4.5	73	4.5	83	5.0	60	4.1
Congregate Care	4.8	29	5.0	30	5.9	18	4.3	19	4.7	17	3.9
Guardian/Other	1.0	12	1.4	9	1.0	10	1.1	5	0.7	6	0.9

Notes: Denominator for each year is the count of girls in foster care during the year in Los Angeles: 2006=4,425; 2007=4,325; 2008=4,069, 2009=3,817; 2010=3,477. Each covariate rate is computed for the focal episode and the denominator is the corresponding characteristics of all girls in care during the year. Episode Length and Placement Stability variables not calculated for girls entering care after giving birth.

first episode in foster care compared to those in repeat episodes. The lowest birth rates were consistently observed among girls placed in guardian homes and other placements. The birth rates to girls in these placements were far lower than the next lowest group, which were girls placed in relative foster homes. On average, 3.3% of those placed with kin gave birth. Girls placed in nonrelative foster homes and congregate care settings tended to have the highest birth rates over all 5 years (4.4% and 4.8%, respectively). Between 2006 and 2010, birth rates of girls in nonrelative foster homes increased while the rate among girls in congregate care decreased.

RACE / ETHNICITY

Table 2 presents general population and foster care birth rates for the three largest racial/ethnic groups. Across all groups and in all years, Latina adolescents had the highest rates of birth. Compared to Latina adolescents in the general population, those in foster care had a birth rate that was roughly 42% higher (4.6 per 100 vs. 3.2 per 100). Latina teenage girls in both the general population and in foster care also had substantially higher birth rates

than their Black and White counterparts. Births rates to Black adolescent girls followed similar patterns: those in foster care had higher rates of birth than those in the general population (30%) and Black adolescents had consistently higher rates of birth than White adolescents. Although White adolescents had the lowest birth rates overall, an examination of within-group differences produced the most notable rate disparities between those

The birth rate of White adolescents in foster care was 5 times greater than the rate of White adolescents in the general population.

in foster care and those in the general population: the birth rate of White adolescents in foster care was 5 times the rate of White adolescents 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 0.4 per 100.

TABLE 2

Birth Rates (per 100) by Race/Ethnicity: Los Angeles County General Population vs. Foster Care Population

	2006-2010	2006		2007		2008		2009		2010	
	Average Birth 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 (LA)											
Latina	**3.2**	4,439	3.6	4,585	3.6	4,383	3.4	3,934	3.0	3,404	2.6
Black	**2.0**	465	2.1	461	2.1	457	2.1	411	2.0	333	1.7
White	**0.4**	213	0.5	209	0.5	161	0.4	163	0.5	136	0.4
Foster Care Population											
Latina	**4.6**	87	4.6	111	5.8	81	4.3	87	4.6	63	3.6
Black	**2.6**	51	2.7	50	2.8	43	2.7	34	2.4	33	2.6
White	**2.0**	14	2.6	10	1.9	9	1.9	5	1.3	7	2.1

Notes: Denominator for each year is the count of girls in foster care during the year in Los Angeles: 2006=4,425; 2007=4,325; 2008=4,069, 2009=3,817; 2010=3,477.

PLACEMENT STATUS AT BIRTH

Among girls in foster care who gave birth during the same year as they were placed in foster care, births could have occurred before, during, or after the foster care placement. Figure 1 presents the average and annual percentages of 15–17 year olds who gave birth during an active foster care placement, after exiting foster

care, or prior to entering foster care. Although the distribution of these three groups varied by year, on average a majority (62.4%) of girls in foster care who gave birth during the same year as their placement did so during an active foster care episode. The remaining girls who gave birth the same year they were placed in foster care were divided between those who gave birth after exiting foster care (16.4%) and prior to entering foster care (21.2%).

FIGURE 1

Girls Placed in Foster Care who Gave Birth During the Year: Percentage who Gave Birth while in Foster Care, After Leaving Foster Care, and Before Entering Foster Care, Los Angeles County 2006–2010

	21.2%	18.7%	18.7%	23.1%	30.0%	15.9%
16.4%	15.5%	19.3%	17.9%	10.0%	18.7%
62.4%	65.8%	62.0%	59.0%	60.0%	65.4%
Average	2006 n=155	2007 n=171	2008 n=134	2009 n=130	2010 n=107

■ **Birth in Care**   ■ **Birth After Care**   ■ **Birth Before Care**
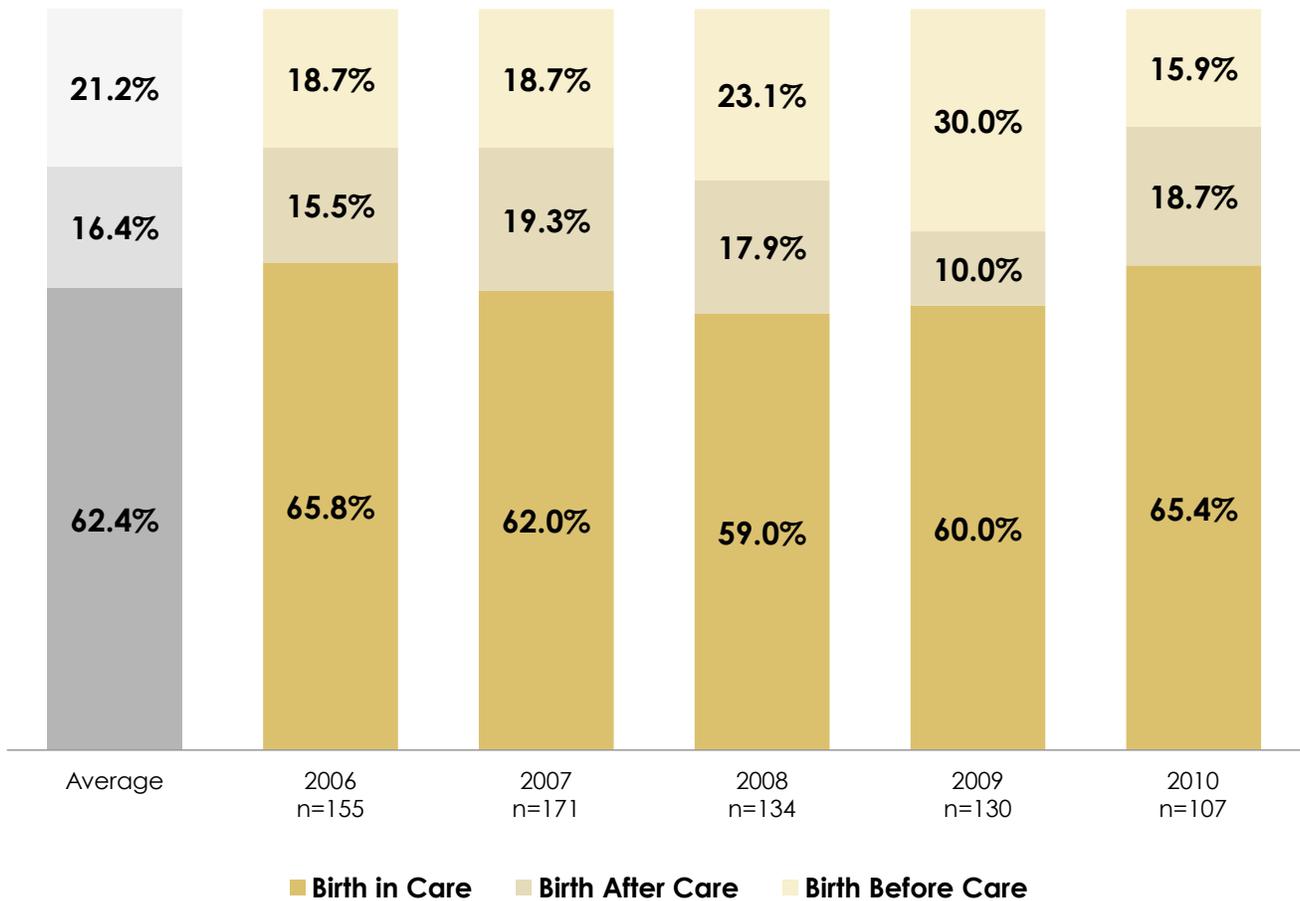
PLACEMENT STATUS AT CONCEPTION

Just as the timing of births and foster care placement varied, so too did the relationship between date of conception and foster care placement. Figure 2 presents the percentage of girls who were in an active foster care placement on the estimated date of conception (by year). Although foster care placement status at conception fluctuated over time, there were no significant trends during the study period. On average, among girls in foster care at any point during the year in which they gave birth, slightly more than half became pregnant outside of care (vs. 47.3% in care at the estimated date of conception). Among girls who gave birth while in foster care, the average percentage who became pregnant during an active foster care placement was higher (62.5%).

FIGURE 2

Foster Care Status on Estimated Date of Conception: Percentage of Births to Girls Placed in Foster Care during the Year and Who Gave Birth While in Care, Los Angeles County 2006-2010

In Foster Care During the Year

In Foster Care at Time of Birth

■ In Foster Care at Conception   ■ Not in Foster Care at Conception
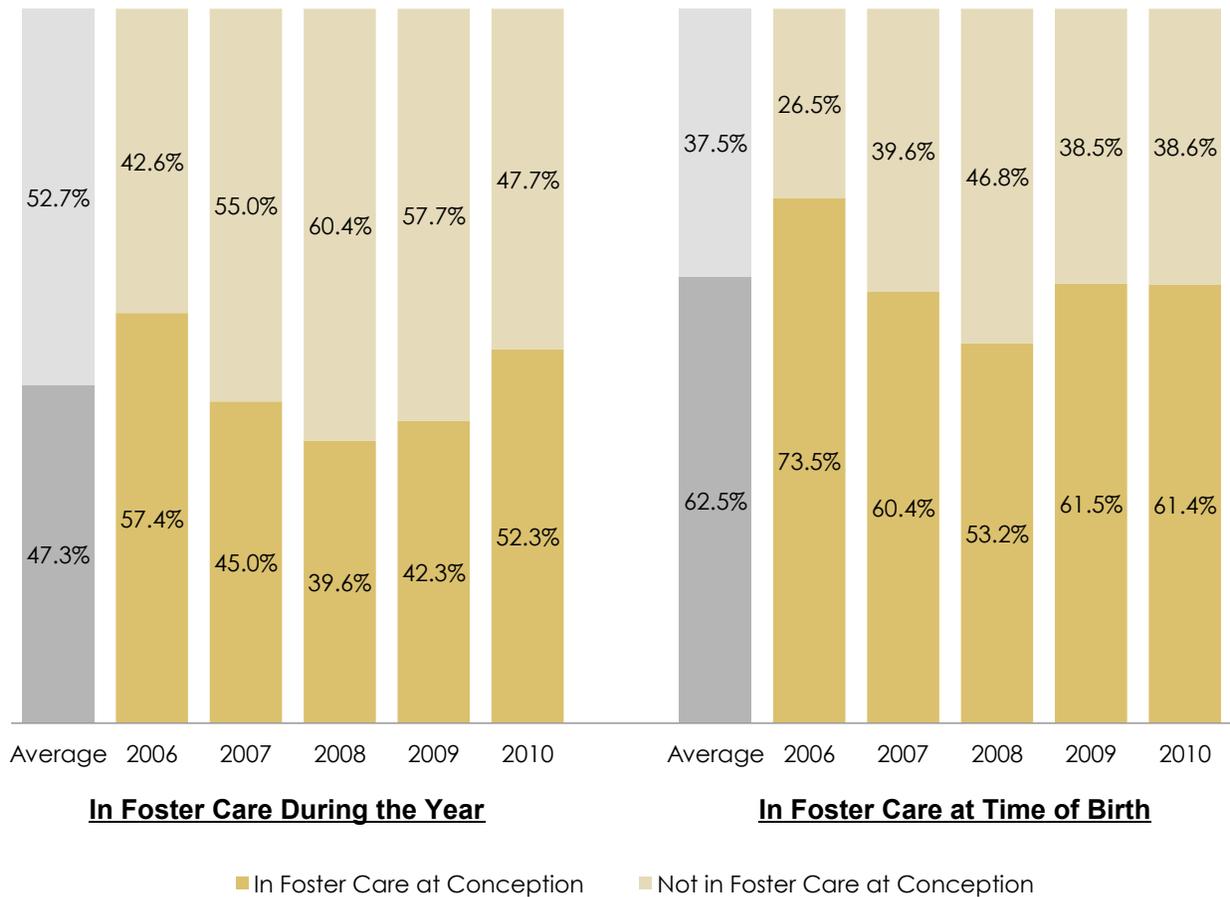
DISCUSSION

SUMMARY

This was the first U.S. study to use population-based vital birth records to examine the annual incidence of childbirth among adolescent girls in foster care. Findings partially confirmed previous research by indicating that the birth rates among 15- to 17-year-old girls in foster care are higher than among similarly aged girls in the overall population. This is not surprising; girls who are placed in foster care represent a very distinct sociodemographic subset of LA's adolescent population, defined by many familial and environmental risks associated with heightened rates of teen births. Girls who gave birth in any given year represented, in absolute numbers, a very small

percentage of the full population of 15- to 17-year-old girls in foster care during the year.

BIRTH RATE DIFFERENCES

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 episode length, placement stability, and placement type. Among girls who gave birth either while in foster care or shortly before entering or exiting a placement, several variables emerged as noteworthy correlates. Our finding that placement stability was associated with birth rates is consistent with a large body of research that has demonstrated a relationship between placement insta-

bility and adverse adolescent outcomes, including pregnancy.[14,48] This finding also comports with qualitative research that suggested girls in foster care who choose to give birth do so because they believe that parenting will 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.[12,49]

A substantial proportion of girls entered or reentered foster care when they were already pregnant (over 50%) or after they gave birth (15.6%), which suggests that circumstances surrounding the pregnancy or birth may have factored into the placement decision.

Some of the lowest birth rates observed across covariates emerged among girls who had been in foster care for 5 or more years. In contrast, those who entered care as adolescents and stayed in care for less than 1 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[50] and that maltreatment occurring during adolescence increases the risk of early pregnancy.[32] Additionally, our data indicated that a substantial proportion of girls entered or reentered foster care when they were already pregnant (over 50%) or after they gave birth (15.6%), which suggests that circumstances surrounding the pregnancy or birth may have factored into the placement decision.

Birth rates also varied by race/ethnicity. Both Black and Latina girls in foster care were consistently more likely to give birth than their White counterparts. Although these racial differences were diminished relative to those observed in the overall teen population, the persistence of teen birth rate disparities by race is notable given that children placed in foster care reflect a much more sociodemographically homogenous subpopulation.[47]

TRENDS

There was a marked decline in the overall Los Angeles birth rate for 15–17 year olds. A less striking decline was observed among girls in this age range who were in foster care during the same year they gave birth. Although the more modest birth rate declines among girls placed in foster care likely reflect an adverse selection of girls who are either pregnant or at acute risk of becoming pregnant into the foster care system, these data underscore opportunities to develop and target prevention services to an identified population of teens at high risk of a first or repeat birth.

LIMITATIONS

Despite this study's strengths in size and its unique use of population-based birth record data to generate new epidemiological information concerning births among girls in foster care, there are several limitations that must be considered. First, we were unable to produce population birth rates for sociodemographically similar youth in Los Angeles. As such, we can only make general population comparisons, even though children placed in foster care have a distinct risk profile. Second, errors and incomplete data are inherent to large-scale administrative data and affected our ability to successfully match vital birth records to CPS data. We linked records using a probabilistic methodology coupled with an extensive clerical review. Although this approach has been deemed superior to deterministic matching for records without unique and verified identifiers,[40,51] it is unknown how many girls should have been matched but were not.

Third, this was a cross-sectional examination of 15- to 17-year-old girls placed in foster care. Although we attempted 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, we were unable to determine whether placement instability contributed to an increased adolescent birth rate among girls in foster care or other factors contributed to both high levels of placement instability and teenage pregnancy. We did not assess the timing or reasons for disruptions in placement, including whether placement instability preceded pregnancy, or how those moves affected placement type during adolescence. We also did not account for the full history of placement types, but rather only examined the placement at the time of birth, at the end of the focal episode, or at entry into care, which limited the conclusions we could draw from the risk associated with where adolescent girls are placed.

FUTURE RESEARCH

This study provided the first population-level examination of the epidemiology of teenage childbearing among girls in foster care and prompted various questions that can and should be addressed in future research. First, future work should use longitudinal data to assess the relationship between placement dynamics in foster care and the timing of both conception and birth. Research should also include an examination of reasons for placement moves, particularly the impact and timing of disruptions. Second, although this study focused on births that occurred during a foster care episode or during the same year as a placement in foster care, an assessment of the effect of foster care placement on the likelihood of births throughout adolescence and outside of this discrete window is needed. Third, future research should investigate well-being 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.

CONCLUSIONS

Recent advocacy efforts in California (California Senate Bill 528) and across the nation have designated girls in foster care as a particular focus of teenage pregnancy prevention. In addition to their greater risk of teen birth, their involvement with public child protection systems means that maltreated foster youth are an accessible high-risk population to whom enhanced prevention services 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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RESEARCH FUNDING

California's Most Vulnerable Parents
Infant Birth Weight and Maltreatment of Adolescent Mothers

Vol 1-5. Infant Birth Weight and Maltreatment of Adolescent Mothers

This study builds upon prior research by exploring maternal maltreatment history as an independent predictor of low birth weight among infants born to teenage mothers. Specifically, it is the first to use population-based birth data linked to official child protection records to examine the effect of maternal maltreatment history on infant birth weight. Findings suggest that adolescents substantiated as victims of abuse or neglect were more likely to give birth to an infant of low birth weight than were sociodemographically similar adolescents who had not been maltreated. Although the increased risk was small and the mechanism unclear, these data suggest that maternal maltreatment may not only have consequences for the victim but may also contribute to intergenerational health disparities.

INTRODUCTION

In 2010, 1 of every 30 infants in the United States was born to a teenage mother.[1] Pregnancy during adolescence is associated with many later adversities for both mother and child,[2-5] including low birth weight.[6-8] Although the mechanisms remain unclear, low birth weight among infants born to teenage mothers may be attributable to adolescent health behaviors,[9-10] access to health

Pregnant teens with a history of maltreatment may have a particularly acute vulnerability to poor birth outcomes.

information and care,[2] or unmeasured maternal selection effects.[11] For example, among women of all ages, smoking is predictive of low birth weight[12,13] and preterm delivery.[14] Timing and duration of prenatal care is also associated with birth outcomes. Lack of prenatal care is associated with increases in preterm births (2.8 times higher for Black and White women),[15,16] as is delayed receipt of prenatal care.[17] Almost 25% of teen mothers do not receive prenatal care until their third trimester.[2]

Exposure to stress and adversity may have health consequences for pregnant women and their unborn children. Pregnant teens with a history of maltreatment may have a particularly acute vulnerability to poor birth outcomes. The traumatic stress associated with maltreatment not only increases the likelihood of substance use and engagement in other risk behaviors associated with infant birth weight,[18-20] but may also instigate physiological changes that affect the course and outcome of pregnancy.[10] Although a history of maltreatment may amplify pregnancy risk, few studies have attempted to quantify this possible relationship.[10,21] Studies that have examined maternal maltreatment and infant birth outcomes have relied on self-reported maltreatment history, used small community samples, and did not focus specifically on preadolescent/adolescent maltreatment among teen mothers. This study builds upon prior research by exploring maternal maltreatment history as an independent predictor of low birth weight among infants born to teenage mothers. Specifically, it is the first to use population-based birth data linked to official child protection records to examine the effect of maternal maltreatment history on infant birth weight.

METHODS

DATA SOURCES

This study used vital birth records matched to administrative child protective services (CPS) records for the state of California. Maternal information for all singleton infants born between 2007 and 2009 to mothers aged 12–19 years was extracted from state vital statistics birth records. These records were linked to CPS data to identify teenage mothers whose maltreatment cases had been substantiated following a CPS investigation (California Welfare & Institutions Code § 300). Linkages were established using probabilistic linkage software in which record pairs were deemed a match or nonmatch based on a formal statistical model.[22,23] Match cut-points were determined through an extensive examination of linked records and a subsequent clerical review of a specified range of uncertain matches falling above and below match thresholds.[24,25]

VARIABLES

For this analysis, teenage mothers were classified as maltreated if there was a CPS-substantiated report of maltreatment after age 10 and prior to giving birth. Maltreatment during preadolescence/adolescence was examined for both substantive and methodological reasons. Specifically, prior research indicates that timing of abuse may influence the effect of maltreatment on high-risk behavior, including sexual behavior and early childbearing, and that this effect is stronger when maltreatment occurs during adolescence compared to early childhood.[26-29] Additionally, given California's transition to a new child protection data collection system in 1998, complete CPS records were only available for teen mothers back to the age of 10.

Low birth weight was based on a gestational weight threshold of 2,500 grams. To isolate the potential effect of maternal maltreatment, eight confounders were included: (1) maternal age (12–16 years, 17–19 years); (2) birth order (first birth, subsequent birth); (3) maternal race/ethnicity (White, Black, Latina, Asian/Pacific Islander, Native American); (4) cigarette smoking during pregnancy (yes, no); (5) prenatal care initiation (first trimester, second trimester, third trimester/no care); (6) birth payment method (private insurance, public insurance); (7) Women, Infant, Children (WIC) utilization (yes, no); and (8) infant gender (female, male).

ANALYSIS

Descriptive statistics were computed and X^2 tests used to compare the distribution of maternal maltreatment and other sociodemographic characteristics stratified by infant birth weight (< 2,500 g vs. ≥ 2,500 g). To examine the effect of maternal maltreatment on infant birth weight, a log Poisson regression model with a robust variance estimation was specified.[30-31] All analyses were conducted using StataSE software.[32] Adjusted risk ratios (RRs) and corresponding 95% confidence intervals (CI) are reported.

RESULTS

Of the 153,743 singleton births to teenage mothers in California between January 1, 2007, and December 31, 2009, 7.1% (n = 10,866) were low birth weight (compared to 5.1% [p < .001] born to mothers older than 19). Among teenage mothers, 13.6% had been substantiated as a victim of maltreatment after age 10 and before giving birth. The proportion of low birth weight infants born to teenage mothers with a history of substantiated maltreatment was slightly higher than infants born to teens with no such history (14.7% vs. 13.5%, respectively, p < .001). Notable and statistically significant differences also emerged among other covariates. Younger maternal

> The risk of low birth weight was 6% greater among infants born to adolescent mothers with a maltreatment history.

age and first birth were associated with an increased risk of low birth weight. Black and Asian/Pacific Islanders comprised a larger share of low birth weight infants than in the overall population of births to adolescent mothers. Infants born to mothers who smoked cigarettes during pregnancy were overrepresented among low birth weight infants; those born to teenage mothers receiving WIC benefits were underrepresented. Child gender and birth payment method were not associated with birth weight; subtle differences were observed by prenatal care.

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Maternal maltreatment history was associated with a 10% increased risk of low birth weight (RR: 1.10; 95% CI: 1.04, 1.16). Maternal smoking, prenatal care, and other confounders modestly attenuated the association between maternal victimization and infant birth weight; yet after adjusting for these other factors, the risk of low birth weight was 6% greater among infants born to adolescent mothers with a maltreatment history (RR: 1.06; 95% CI: 1.01, 1.12). Bivariate associations observed for other covariates remained in the multivariable model, with the largest relative differences in birth weight associated with race/ethnicity, cigarette smoking, and receipt of WIC benefits.

TABLE 1

Demographic Characteristics and Adjusted Relative Risk of Low Birth Weight among Infants born to Adolescent Mothers in California, 2007–2009

	Normal Birth Weight (≥ 2500g) N=142,720		Low Birth Weight (< 2500g) N=10,161			Adjusted Risk of Low Birth Weight N=139,179	
	n	%	n	%	X^2 Test	Adj. RR	95% CI
Maternal Maltreatment History							
Non-victim	123,485	86.4%	8,664	85.3%	p < .001	Ref.	---
Victim of abuse/neglect	19,235	13.5%	1,497	14.7%		1.06*	(1.01, 1.13)
Maternal Age at Birth							
12–16 years	22,345	15.7%	1,749	17.2%	p < .001	1.09**	(1.04, 1.15)
17–19 years	120,375	84.3%	8,412	82.8%		Ref.	---
Birth							
First birth	117,729	82.6%	8,612	84.9%	p < .001	1.17***	(1.11, 1.24)
Subsequent birth	24,887	17.5%	1,534	15.1%		Ref.	---
Race/Ethnicity							
White	19,706	14.0%	1,272	12.8%		Ref.	---
Black	11,750	8.4%	1,358	13.7%		1.84***	(1.70, 2.00)
Latino	104,482	74.5%	6,861	68.8%	p < .001	1.13***	(1.06, 1.20)
Asian/Pacific Islander	3,474	2.5%	415	4.2%		1.87***	(1.67, 2.09)
Native American	899	0.6%	63	0.6%		1.12	(0.86, 1.45)
Smoked During Pregnancy							
Yes	4,043	2.9%	373	3.8%	p < .001	1.30***	(1.17, 1.45)
No	134,782	97.1%	9,454	96.2%		Ref.	---
Initiation of Prenatal Care							
First trimester	95,297	68.5%	6,660	68.3%		Ref.	---
Second trimester	17,316	12.5%	1,136	11.7%	p < .001	0.93*	(0.87, 0.99)
Third trimester / No Care	26,515	19.1%	1,951	20.0%		0.99	(0.94, 1.04)
Birth Payment Method							
Public	115,983	82.2%	8,261	82.1%	p = .825	1.09**	(1.03, 1.15)
Private	25,090	17.8%	1,788	17.9%		Ref.	---
Received WIC							
Yes	117,690	84.5%	7,809	79.4%	p < .001	Ref.	---
No	21,540	15.5%	2,021	20.6%		1.39***	(1.32, 1.46)
Child sex							
Female	69,446	48.7%	5,030	49.5%	p = .100	Ref.	---
Male	73,274	51.3%	5,131	50.5%		0.98	(0.94, 1.02)

Notes: Summed counts may not equal column totals due to missing values for some variables.
 *p < .05; **p < .01; ***p < .001
CI = confidence interval; Adj. RR = adjusted risk ratio; Ref = reference group
The proportion of cases with missing values for a given variable ranged from 0% (child sex) to 3.2% (prenatal care).

DISCUSSION

SUMMARY

This was the first population-based study to validate the relationship between officially substantiated maternal maltreatment and low birth weight among infants born to teenage mothers. Previous research has demonstrated that child maltreatment is associated with negative outcomes during both childhood[33-35] and adulthood.[35-39] The results of this study suggest that the consequences of maltreatment may also be intergenerational. Although the magnitude of the effect was small relative to other established risk factors, maternal maltreatment history emerged as a significant and independent hazard for an already high-risk population of infants born to teenage mothers.

Previous research has demonstrated that child maltreatment is associated with negative outcomes during both childhood and adulthood.

LIMITATIONS

There are several limitations that must be noted. First, complete data for maltreatment after age 10 was available for examination; the number of mothers who experienced earlier maltreatment and how maltreatment prior to age 10 may have affected infant birth weight is unknown. Second, these data do not address the potential mechanisms by which maternal maltreatment affects birth weight. Third, other risk factors, such as prenatal drug or alcohol exposure, which may affect birth weight, were unavailable in the data. Last, the data included only a crude measure of maternal socioeconomic status (i.e.,

birth payment method) and therefore do not capture community-level poverty information. As such, it is unknown whether other measures of poverty would have moderated the observed relationship between maltreatment and birth weight.

These findings suggest maltreatment not only affects the health and emotional well-being of individual victims but also contributes to intergenerational health disparities.

CONCLUSIONS

The finding of a relationship between maltreatment history and infant birth weight aligns with research that similarly suggests that abuse and other adversities negatively affect health and well-being throughout the life course.[36-40] The association between a history of maltreatment victimization and infant birth weight may reflect physiological changes or chronic maternal stress responses. Regardless of the mechanism and despite the modest effect relative to other risk factors, these findings are provocative in that they suggest maltreatment not only affects the health and emotional well-being of individual victims but also contributes to intergenerational health disparities. Future research is needed to explicate the relationship by which maltreatment affects maternal and child health, framing maltreatment as an adverse exposure that may influence the uterine environment.

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SECTION 4: NEXT STEPS...

Monitoring the incidence of first and repeat births among girls currently and formerly involved with CPS – including birth outcomes and next generation maltreatment – is critical to evaluating the efficacy of pregnancy prevention efforts and determining the nature of services that are needed for young mothers and children. The findings to emerge from this study are illustrative of the knowledge that can be generated through the linkage and analysis of administrative data.

Yet, although the digital world now allows us to cost-effectively curate and utilize data and information on a scale that was once unimaginable, the utility of the data collected by CPS and other public agencies has yet to be fully realized. Significant gaps in our understanding of transition-age youth involved with CPS remain – many of which could be addressed through a better use of data we already collect (for example, see Dennis Culhane's use of multiple data sources in his repot "Young Adult Outcomes of Youth Exiting Dependent or Delinquent Care in Los Angeles county").

Ideas for future research that might further inform our understanding of pregnant and parenting girls include:

- an examination of mother and child placement moves following a birth that occurs in foster care

- a prospective and comparative analysis of the likelihood of a teen birth among girls who have been substantiated for maltreatment, but remain at home rather than entering foster care

- linkages with early intervention program data to identify which teen mothers in the foster care system receive services and the impact of those services on maternal and child outcomes

- linkages with Medicaid data to generate a sociodemographically similar population of girls who are not involved with CPS and could be administratively followed over time

- cost analyses

Vol.1-1: California Table and Figure

Vol.1-1, State Table 1:

Sociodemographic and Health Characteristics of Teens who Gave Birth in California in 2009 by History of Child Protective Services Involvement

	Adolescent Births (N=35,098)		Reported for Alleged Maltreatment (N = 15,754)		Substantiated as Victim of Maltreatment (N=7,293)		Placed in Foster Care because of Maltreatment (N = 3,408)	
	n	(col%)	row %	χ^2	row %	χ^2	row %	χ^2
Maternal Age at Birth								
12 - 15 years	1,856	(5.3)	55.9		31.3		11.6	
16 - 17 years	10,043	(28.6)	48.1	*P* < .001	22.8	*P* < .001	10.1	*P* = .004
18 - 19 years	23,199	(66.1)	42.6		19.1		9.4	
Births								
First Birth	29,224	(83.4)	41.9	*P* < .001	19.4	*P* < .001	9.2	*P* < .001
Repeat Birth	5,839	(16.6)	59.8		27.6		12.5	
Race/Ethnicity								
Black	3,787	(11.0)	59.3		31.8		21.1	
White	5,427	(15.7)	51.3		24.3		11.7	
Latina	24,219	(70.2)	41.2	*P* < .001	18.4	*P* < .001	7.6	*P* < .001
Asian/Pacific Islander	802	(2.3)	37.5		14.1		5.6	
Native American	269	(0.8)	68.4		35.3		21.2	
Smoked During Pregnancy								
No	33,155	(96.8)	44.1	*P* < .001	20.3	*P* < .001	9.3	*P* < .001
Yes	1,101	(3.2)	69.1		37.0		21.3	
Prenatal Care								
First Trimester	23,663	(67.4)	44.8		20.7		9.7	
Second Trimester	4,263	(12.1)	45.2	*P* = .104	19.9	*P* =.012	8.6	*P* = .001
Third Trimester	5,986	(17.1)	44.2		20.9		9.9	
No Care / Missing	1,186	(3.4)	48.1		24.3		12.9	
Birth Payment Method								
Public	27,571	(79.5)	47.3	*P* < .001	22.6	*P* < .001	11.0	*P* < .001
Private	7,101	(20.5)	36.2		14.1		5.0	

Notes. Summed counts may not equal column total due to missing values for some variables. Summed percentages may not equal 100% due to rounding.

Vol.1-1, State Figure 1:

Percentage of Adolescent Mothers Giving Birth in California in 2009 Reported or Substantiated for Pre-Conception Neglect, Physical Abuse, Sexual Abuse, or Emotional Abuse
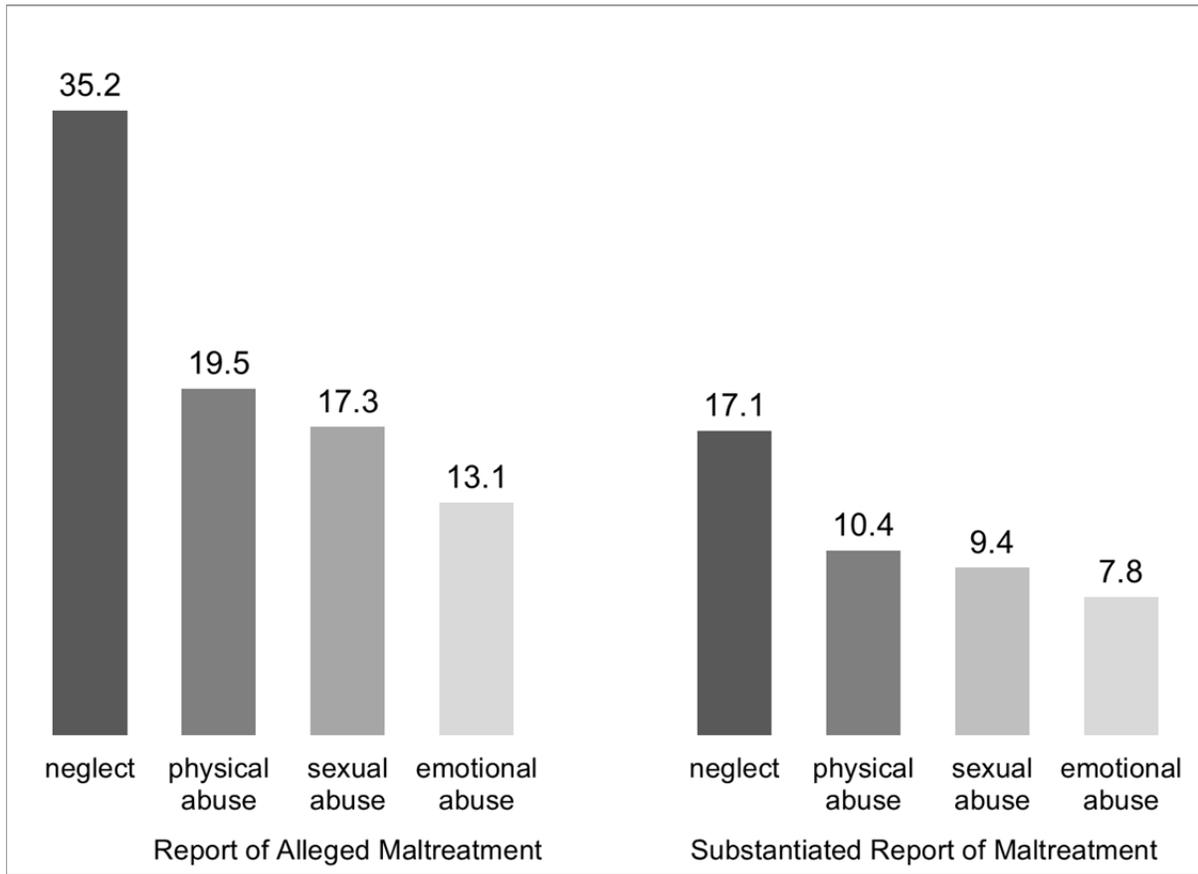
Notes. Percentages reflect the proportion of adolescent mothers with any history of alleged or substantiated neglect, physical abuse, sexual abuse, or emotional abuse. Adolescents reported and substantiated for more than one form of maltreatment appear in more than one category.

Vol.1-2: California Tables and Figures

Vol.1-2, State Figure 1:
Cumulative Percentage of Girls in Foster Care at Age 17 Who Had a First Birth before Age 20, California 2003-2007
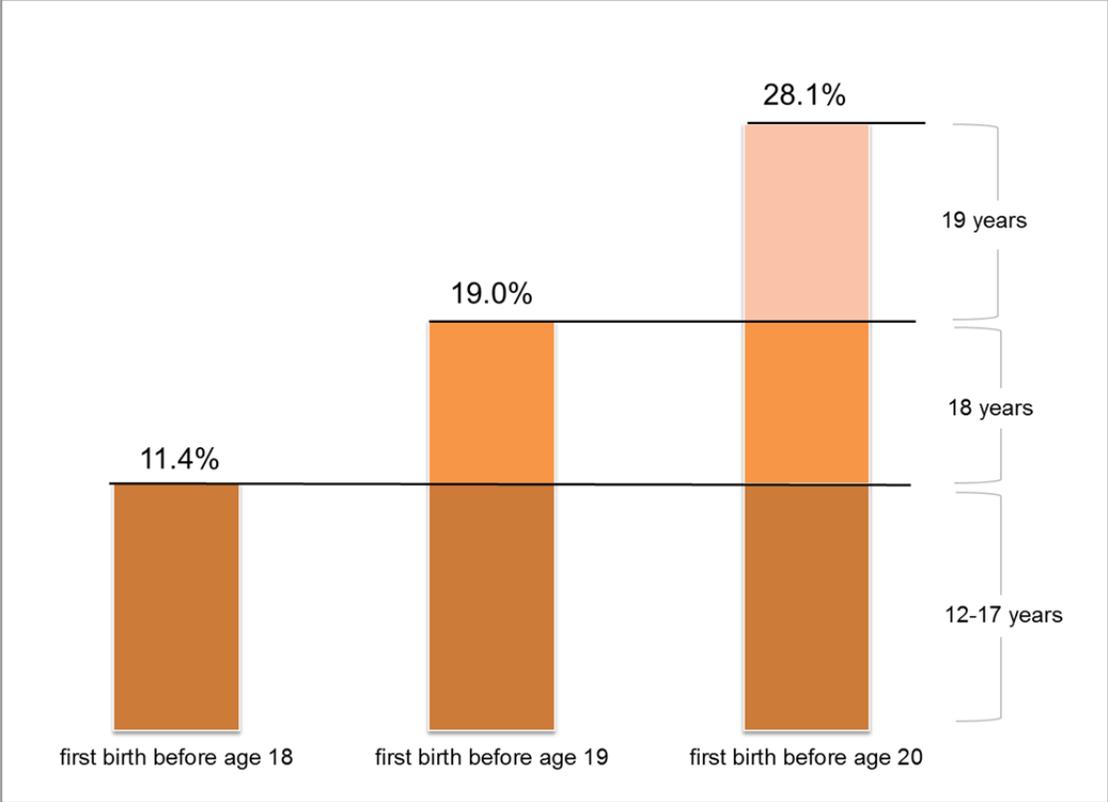
Vol.1-2, State Table 1:

Descriptive Characteristics of Girls in Foster Care at Age 17 in California: First Birth Rates (per 100), Crude Risk Ratios, and 95% Confidence Intervals before Age 18 and Age 20, 2003–2007

	In Care age 17		First Birth Before Age 18 (vs. no birth before age 18)				First Birth Before Age 20 (vs. no birth before age 20)			
	2003-2007		births	rate	crude risk ratios		births	rate	crude risk ratios	
	N	col %	n	per 100	RR	(95% CI)	n	per 100	RR	(95% CI)
Total	20,222	100.0%	2,311	11.4	--	--	5,678	28.1	--	--
Race/Ethnicity										
White	5,786	28.6%	441	7.6	Ref.	--	1,306	22.6	Ref.	--
Black	6,559	32.4%	679	10.4	1.36***	(1.21, 1.52)	1,701	25.9	1.15***	(1.08, 1.22)
Latina	7,070	35.0%	1,130	16.0	2.10***	(1.89, 2.33)	2,506	35.5	1.57***	(1.48, 1.66)
Other/Missing	807	4.0%	61	7.6	0.99	(0.76, 1.29)	165	20.5	0.92	(0.80, 1.07)
Removal Reason										
Neglect	13,897	68.7%	1,739	12.6	Ref.	--	4,011	28.9	Ref.	--
Physical Abuse	2,519	12.5%	208	8.3	0.66***	(0.57, 0.75)	681	27.0	0.94	(0.87, 1.01)
Sexual Abuse	1,730	8.6%	165	9.5	0.76***	(0.65, 0.88)	480	27.8	0.96	(0.88, 1.04)
Other/Missing	2,076	10.3%	189	9.1	0.72***	(0.62, 0.83)	506	24.4	0.84***	(0.77, 0.91)
Episode Length										
≥ 60 months	8,628	42.9%	694	8.0	Ref.	--	1,988	23.0	Ref.	--
36-59 months	3,209	16.0%	412	12.8	1.59***	(1.42, 1.79)	960	29.9	1.30***	(1.22, 1.39)
12-35 months	5,225	26.0%	790	15.1	1.88***	(1.71, 2.07)	1,716	32.8	1.43***	(1.35, 1.51)
< 12 months	3,031	15.1%	405	13.4	1.66***	(1.48, 1.86)	990	32.7	1.42***	(1.33, 1.51)
Placement Count										
1 placement	4,888	24.2%	461	9.4	Ref.	--	1,194	24.4	Ref.	--
2-3 placements	5,780	28.6%	589	10.2	1.08	(0.96, 1.21)	1,505	26.0	1.07	(0.99, 1.14)
4+ placements	9,554	47.3%	1,261	13.2	1.40***	(1.27, 1.55)	2,979	31.2	1.28***	(1.21, 1.35)
Last Placement Type										
Kinship	5,730	28.3%	662	11.6	Ref.	--	1,626	28.4	Ref.	--
Non-kin	7,406	36.6%	878	11.9	1.03	(0.93, 1.13)	2,210	29.8	1.05	(1.00, 1.11)
Congregate Care	3,797	18.8%	568	15.0	1.29***	(1.17, 1.44)	1,248	32.9	1.16***	(1.10, 1.23)
Guardian/Other	3,289	16.3%	203	6.2	0.53***	(0.46, 0.62)	594	18.1	0.64***	(0.59, 0.69)
Final Exit										
Emancipation	14,999	74.2%	1,723	11.5	Ref.	--	4,128	27.5	Ref.	--
Reunification	2,745	13.6%	340	12.4	1.08	(0.97, 1.20)	869	31.7	1.15***	(1.09, 1.22)
Adoption/Guard.	825	4.1%	59	7.2	0.62***	(0.48, 0.80)	150	18.2	0.66***	(0.59, 0.78)
Runaway	847	4.2%	111	13.1	1.14	(0.95, 1.36)	309	36.5	1.33***	(1.21, 1.45)
Other	806	4.0%	78	9.7	0.84	(0.67, 1.05)	222	27.5	1.00	(0.89, 1.12)

Notes. Summed counts may not equal column totals due to missing values for some variables.
Ref = reference group; RR = risk ratio; CI = confidence interval; Guard = guardianship.
*p < .05; **p < .01; ***p < .001

Vol.1-2, State Table 2:

Repeat Birth Rates (per 100 first births) by Age at First Teen Birth Among Girls in Foster Care at Age 17 in California, 2003–2007

	Repeat Teen Birth (first birth before age 18; N=2,311)				Repeat Teen Birth (first birth before age 19; N=3,835)			
	repeat births		crude risk ratio		repeat births		crude risk ratio	
	n	rate per 100	RR	(95% CI)	*n*	rate per 100	RR	(95% CI)
Total	953	41.2	--	--	1,188	31.0	--	--
Race/Ethnicity								
White	161	36.5	Ref.	--	216	26.5	Ref.	--
Black	255	37.6	1.03	(0.88, 1.20)	330	28.8	1.09	(0.94, 1.26)
Latina	511	45.2	1.24**	(1.08, 1.42)	605	34.3	1.30***	(1.14, 1.48)
Other/Missing	26	42.6	1.20	(0.87, 1.65)	37	34.6	1.36*	(1.02, 1.81)
Removal Reason								
Neglect	720	41.2	Ref.	--	886	31.8	Ref.	--
Physical Abuse	86	41.4	1.00	(0.85, 1.19)	120	28.9	0.91	(0.78, 1.07)
Sexual Abuse	70	42.4	1.03	(0.86, 1.24)	87	28.9	0.91	(0.76, 1.10)
Other/Missing	77	40.7	0.99	(0.83, 1.19)	95	28.9	0.91	(0.76, 1.09)
Episode Length								
≥ 60 months	266	38.3	Ref.	--	344	27.2	Ref.	--
36-59 months	176	42.7	1.11	(0.96, 1.29)	219	33.0	1.21**	(1.05, 1.40)
12-35 months	340	43.0	1.12	(0.99, 1.27)	402	33.7	1.24**	(1.10, 1.40)
< 12 months	170	42.0	1.10	(0.94, 1.27)	221	31.5	1.16*	(1.01, 1.33)
Placement Count								
1 placement	189	41.0	Ref.	--	244	30.5	Ref.	--
2-3 placements	231	39.2	0.96	(0.82, 1.11)	287	29.3	0.96	(0.83, 1.11)
4+ placements	533	42.3	1.03	(0.91, 1.17)	657	32.0	1.05	(0.93, 1.18)
Last Placement Type								
Kinship	263	39.7	Ref.	--	328	29.5	Ref.	--
Non-kin	366	41.7	1.05	(0.93, 1.19)	471	32.0	1.08	(0.96, 1.22)
Congregate Care	250	44.0	1.11	(0.97, 1.26)	301	33.7	1.14*	(1.01, 1.30)
Guardian/Other	74	36.5	0.92	(0.75, 1.13)	88	24.4	0.83	(0.67-1.01)
Final Exit								
Emancipation	701	40.7	Ref.	--	852	30.6	Ref.	--
Reunification	147	43.2	1.06	(0.93, 1.22)	196	32.2	1.05	(0.93, 1.20)
Adoption/Guard.	19	32.2	0.79	(0.54, 1.15)	24	25.8	0.84	(0.59, 1.20)
Runaway	50	45.1	1.11	(0.89, 1.37)	67	32.4	1.06	(0.86, 1.30)
Other	36	46.2	1.13	(0.89, 1.45)	49	34.5	1.13	(0.89, 1.42)

Notes. Summed counts may not equal column totals due to missing values for some variables.
Ref = reference group; RR = risk ratio; CI = confidence interval; Guard = guardianship.
*$p < .05$; **$p < .01$; ***$p < .001$

Vol.1-3: California Tables and Figures

Vol.1-3, State Table 1:
Characteristics of Children Born to Primiparous Adolescents in California in 2006 and 2007 by Child Maltreatment Status at Age 5

	All Births N = 85,084 (2006–2007)		Child Reported n = 20,063 (vs. no report by age 5)			Child Substantiated n = 6,594 (vs. no substantiation by age 5)		
	N	col %	n	row %	χ^2	n	row %	χ^2
Maternal Maltreatment								
No report	60,999	71.7	10,591	17.4		3,087	5.1	
Unsubstantiated report	14,081	16.6	5,059	35.9	p < .001	1,710	12.1	p < .001
Substantiated Report	10,004	11.8	4.413	44.1		1,797	18.0	
Maternal Age at Birth								
15–16 years	14,350	16.9	4,335	30.2		1,341	9.3	
17–18 years	40,084	47.1	9,522	23.8	p < .001	3,169	7.9	p < .001
19 years	30,650	36.0	6,206	20.3		2,084	6.8	
Maternal Race/Ethnicity								
White	12,639	15.1	4,446	35.2		1,617	12.8	
Black	7,179	8.6	2,682	37.4		889	12.4	
Latina	61,053	72.9	11,979	19.6	p < .001	3,778	6.2	p < .001
Asian/Pacific Islander	2,421	2.9	450	18.6		141	5.8	
Native American	490	0.6	207	42.2		78	15.9	
Birth Payment Method								
Private	19,976	23.6	4,627	23.2	p = .111	1,420	7.1	p < .001
Public	64,698	76.4	15,340	23.7		5,140	7.9	
Initiation of Prenatal Care								
First trimester	60,322	70.9	13,847	23.0		4,478	7.4	
Second trimester	18,671	21.9	4,558	24.4	p < .001	1,488	8.0	p < .001
Third trimester	3,781	4.4	924	24.4		319	8.4	
No care/missing	2,310	2.7	734	31.8		309	13.4	
Pregnancy Terminations								
None	80,968	95.2	18,935	23.4	p < .001	6,178	7.6	p < .001
Prior termination	4,116	4.8	1,128	27.4		416	10.1	
Infant Birth Weight								
Normal (≥ 2500 g)	79,008	92.9	18,367	23.3	p < .001	5,967	7.6	p < .001
Low (< 2500 g)	6,076	7.1	1,696	27.9		627	10.3	

Notes. Summed counts may not equal column totals due to missing values for some variables. Summed percentages in "All Births" column may not equal 100% due to rounding. χ^2 tests used to compare the characteristics of children reported for maltreatment vs. children not reported and to compare the characteristics of children substantiated for maltreatment vs. children not substantiated.

Vol.1-3, State Table 2:

Adjusted Risk of Reported and Substantiated Maltreatment by Age 5 among Children born in California to Primiparous Adolescent Mothers in 2006 and 2007

	Child Reported for Maltreatment (vs. no report by age 5)		Child Substantiated for Maltreatment (vs. no substantiation by age 5)	
	Adj. HR	(95% CI)	Adj. HR	(95% CI)
Maternal Maltreatment				
No report	Ref.	--	Ref.	--
Unsubstantiated report	2.08***	(2.00, 2.15)	2.22***	(2.09, 2.35)
Substantiated report	2.66***	(2.57, 2.76)	3.27***	(3.08, 3.48)
Maternal Age at Birth				
15–16 years	1.63***	(1.57, 1.70)	1.37***	(1.28, 1.47)
17–18 years	1.19***	(1.16, 1.23)	1.14***	(1.09, 1.22)
19 years	Ref.	--	Ref.	--
Maternal Race/Ethnicity				
White	Ref.	--	Ref.	--
Black	0.95	(0.91, 1.01)	0.84***	(0.78, 0.92)
Latina	0.53***	(0.51, 0.55)	0.53***	(0.50, 0.56)
Asian/Pacific Islander	0.51***	(0.47, 0.56)	0.51***	(0.43, 0.60)
Native American	1.06	(0.92, 1.22)	1.06	(0.84, 1.32)
Birth Payment Method				
Private	Ref.	--	Ref.	--
Public	1.11***	(1.08, 1.15)	1.19***	(1.12, 1.26)
Initiation of Prenatal Care				
First trimester	Ref.	--	Ref.	--
Second trimester	1.04	(1.00, 1.08)	1.06	(0.99, 1.12)
Third trimester	1.07*	(1.01, 1.15)	1.17**	(1.04, 1.31)
No care/missing	1.36***	(1.26, 1.47)	1.64***	(1.45, 1.86)
Pregnancy Terminations				
None	Ref.		Ref.	--
Prior termination	1.12***	(1.06, 1.19)	1.20***	(1.09, 1.33)
Infant Birth Weight				
Normal (≥ 2500 g)	Ref.		Ref.	--
Low (< 2500 g)	1.23***	(1.16, 1.29)	1.35***	(1.24, 1.46)

Notes. $*p < .05$; $**p < .01$; $***p < .001$
Ref = reference group; Adj = Adjusted; CPS = child protective services; HR = hazard ratio; CI = confidence interval.

Vol.1-3, State Figure 1:

Cumulative Rate of Children Born to Primiparous Adolescent Mothers in California in 2006 or 2007 who were Reported and Substantiated for Maltreatment by Age 5, Stratified by Maternal History of Maltreatment (No Report, Unsubstantiated Report, Substantiated Report)
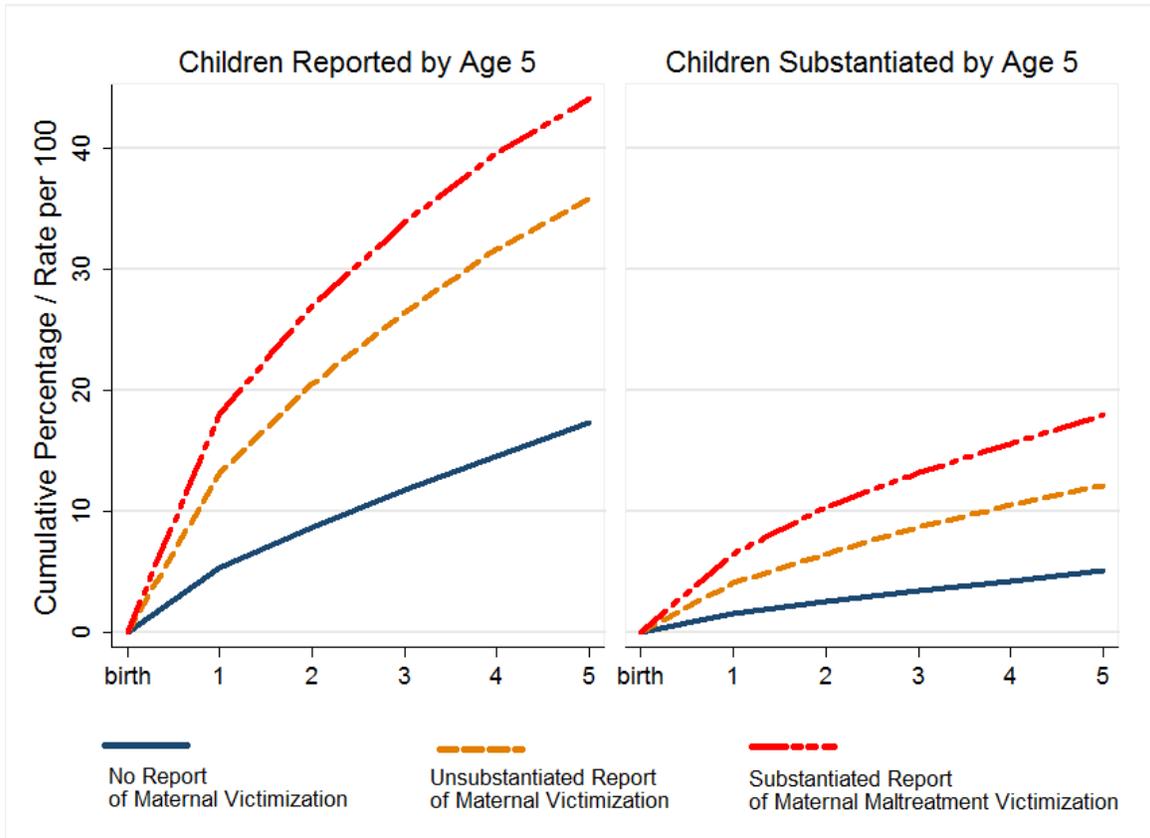
Vol.1-4: California Tables and Figures

Vol.1-4, State Table 1:
Births to Girls Age 15–17 in a Los Angeles County Foster Care Placement during the Year: General Population Comparison, Average Birth Rate 2006–2010, Birth Rates by Year, and Distribution by Race and Placement-Related Experiences

	2006-2010	2006		2007		2008		2009		2010		Trends
	Avg. Rate/100	Births	Rate/100	Births	Rate/100	Births	Rate/100	Births	Rate/100	Births	Rate/100	Rate/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	
Placed in Foster Care	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+	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. Denominator for each year is the count of 15-17 year old girls in foster care as of July1: 2006=7,978; 2007=7,870; 2008=7,323, 2009=6,779; 2010=6,139. Each covariate rate is computed for the focal episode and the denominator is the corresponding characteristics of all female youth in care on July 1. Episode Length and Placement Stability variables not calculated for girl entering care after giving birth.

Vol.1-4, State Table 2:

Birth Rates by Race/Ethnicity: Foster Care Population vs. General Population, 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)											
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	1800	0.7	1613	0.6	1488	0.6	1297	0.5
Foster Care Population											
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

Vol.1-4, State Figure 1:

Girls Placed in Foster Care who Gave Birth during the Same Year: Percentage who Gave Birth while in Foster Care, After Leaving Foster Care, and Before Entering Foster Care, 2006–2010
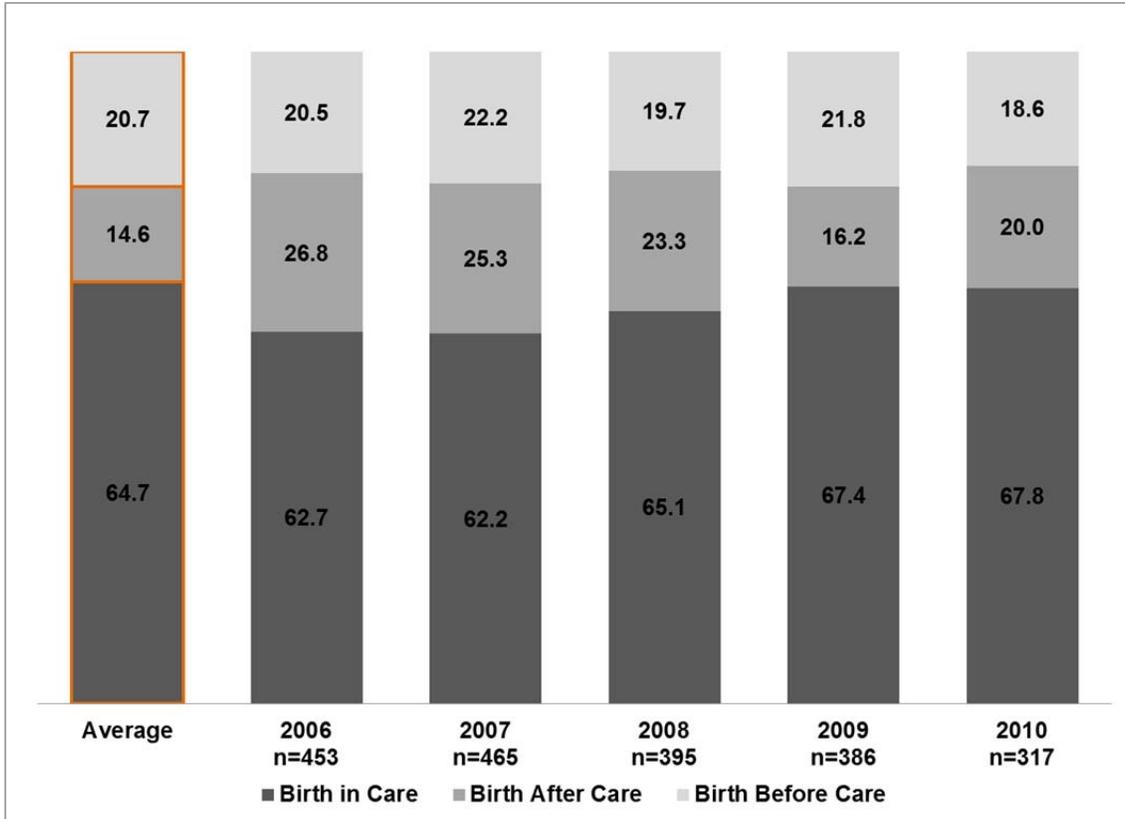
Vol.1-4, State Figure 2:

Foster Care Status on Estimated Date of Conception: Percentage of Births to Girls Placed in Foster Care during the Same Year and who Gave Birth while in Foster Care