

2019

# Referral Patterns and Service Provision in Child Protective Services: Child, Caregiver, and Case Predictors

Hannah Mead Holbrook  
*University of Vermont*

Follow this and additional works at: <https://scholarworks.uvm.edu/graddis>

 Part of the [Psychology Commons](#), [Public Health Commons](#), and the [Social Work Commons](#)

---

## Recommended Citation

Holbrook, Hannah Mead, "Referral Patterns and Service Provision in Child Protective Services: Child, Caregiver, and Case Predictors" (2019). *Graduate College Dissertations and Theses*. 921.  
<https://scholarworks.uvm.edu/graddis/921>

This Dissertation is brought to you for free and open access by the Dissertations and Theses at ScholarWorks @ UVM. It has been accepted for inclusion in Graduate College Dissertations and Theses by an authorized administrator of ScholarWorks @ UVM. For more information, please contact [donna.omalley@uvm.edu](mailto:donna.omalley@uvm.edu).

REFERRAL PATTERNS AND SERVICE PROVISION IN CHILD PROTECTIVE  
SERVICES: CHILD, CAREGIVER, AND CASE PREDICTORS

A Dissertation Presented

by

Hannah M Holbrook

to

The Faculty of the Graduate College

of

The University of Vermont

In Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy  
Specializing in Psychology

October, 2019

Defense date: May 16, 2018  
Dissertation Examination Committee:

James J. Hudziak, M.D., Advisor  
Jessica Strolin-Goltzman, Ph.D., Chairperson  
Rex Forehand, Ph.D.  
Timothy Stickle, Ph.D.  
Matthew Price, Ph.D.  
Cynthia J. Forehand, Ph.D., Dean of the Graduate College

## Abstract

Child maltreatment, and recurrent maltreatment in particular, occurs at an alarmingly high rate. Frequency of reports to Child Protective Services (CPS) is associated with negative psychological outcomes, and children whose reports are unsubstantiated experience similar risk of behavioral, emotional, and substance use disorders as those whose reports are substantiated. Prior research has demonstrated that children with no CPS reports and children with one CPS report showed no significant differences in rates of maltreatment perpetration or substance use in adulthood, suggesting that prevention efforts after one report may have strong merit in reducing negative outcomes in adulthood. However, patterns and risk factors of unsubstantiated reports have been only minimally explored thus far, despite having been found to predict subsequent maltreatment. The current study extends upon previous research by (a) examining both substantiated and unsubstantiated reports to identify longitudinal patterns of timing and recurrence and (b) assessing the extent to which service provision mediates long-term recurrence after each type of report. Analyses were conducted using subsamples of a longitudinal national dataset from 2011-2015 containing data from CPS reports for 3,655,951 children. Measures included child, caregiver, and CPS case characteristics obtained at the time of first report in 2011. Latent class analysis of referral patterns indicated four classes of recurrence patterns: (1) 2011 unsubstantiation followed by moderate recurrence, (2) 2011 unsubstantiation followed by low recurrence, (3) 2011 substantiation followed by moderate recurrence, and (4) 2011 substantiation followed by low recurrence. Multinomial logistic regression with most likely class membership as the outcome variable indicated that domestic violence, caregiver substance abuse, and poverty were better predictors of initial substantiation status than of long-term recurrence. Prior victimization was predictive of initial substantiation status as well as long-term recurrence. Asian American race predicted low rates of recurrence. Latent class analysis of service provision revealed only two classes: a class of children who received services and a class of children who did not. Service provision partially mediated associations between initial substantiation status and five-year maltreatment recurrence, as measured by number of subsequent reports, number of subsequent substantiated reports, and number of subsequent years in foster care. Limitations are considered and implications of using predictive modeling to drive service prioritization are discussed.

## **Dedication**

This dissertation is dedicated to my husband, my parents, and my sister.

Adam, thank you for always supporting my passions. Every day, I feel your unwavering belief in me and your conviction in the value of my work. Our shared strivings for a balanced life have made these past five years so enjoyable.

Mom, Dad, and Eliza, thank you for teaching me to value hard work and that caring for others is the most important task we have. Thank you for the consistent reminders, both past and present, of the joys of family relationships.

## Acknowledgements

I gratefully acknowledge the collaborative work of Jim Hudziak and Joan Kaufman, who provided the opportunity that introduced me to the field of child maltreatment. Jim has taught me that the significance of our research findings lies in the resulting actions we take to improve child and family outcomes. He has immeasurably strengthened my ability to translate statistical results into meaningful, big picture implications. I am appreciative of the thoughtful feedback and enthusiasm of my committee members, Rex Forehand, Matthew Price, Jessica Strolin-Goltzman, and Tim Stickle, throughout this process.

I am very grateful for the support of my compassionate, intelligent, and spirited cohort of classmates. I would especially like to thank Kerry O'Loughlin for years of reading drafts, discussing ideas, and celebrating successes with me in our (many different) offices. Kerry has consistently helped remind me of the immense hope and opportunity within this field, and never fails to convince me, when I get too close to my own work, that my ideas and findings are indeed interesting and important.

I would also like to acknowledge the collegiality and dedication of the staff at the Burlington, St. Albans, and Middlebury DCF offices, who consistently advocated for our research efforts. A nuanced view of the challenges and recurrence experienced by many families sparked the questions explored in this dissertation.

This dissertation was made possible by the intensive efforts of NCANDS personnel, staff, and the many, many dedicated CPS caseworkers who entered and uploaded data for each child. Their efforts allow for the type of statistical analyses that are only possible with large data sets.

## Table of Contents

|   |     |
|---|-----|
| Dedication .....  | ii  |
| Acknowledgements .....  | iii |
| List of Tables .....  | v   |
| List of Figures .....   | vii |
| Introduction .....  | 1   |
| Recurrent Contact with CPS .....  | 3   |
| Outcomes by Substantiation Status .....                                 | 5   |
| A Call for Trajectory Prediction .....                                  | 6   |
| Latent Class Analyses .....   | 8   |
| Gaps in the Literature .....  | 11  |
| The Current Study .....   | 12  |
| Aims and Hypotheses .....   | 12  |
| Methods .....   | 14  |
| Participants .....  | 14  |
| Measures .....  | 17  |
| Procedure .....   | 18  |
| Data Analyses .....   | 19  |
| Missing Data .....  | 21  |
| Results .....   | 23  |
| Patterns of CPS Contact .....   | 23  |
| Latent class analyses. ....   | 25  |
| Predictors of latent classes. ....                                      | 27  |
| Split half reliability analysis. ....                                   | 29  |
| Service Provision Analyses .....  | 30  |
| Latent class analysis of service provision. ....                        | 31  |
| Path analyses. ....   | 32  |
| Split-half reliability analysis. ....                                   | 35  |
| Latent class analysis of service provision in substantiated cases. .... | 36  |
| Discussion .....  | 37  |
| Latent Classes of Substantiation Status .....                           | 37  |
| Predictors of Substantiation Status Latent Classes .....                | 41  |
| Latent Classes of Service Provision .....                               | 45  |
| Service Provision Mediation Models .....                                | 46  |
| Limitations .....   | 49  |
| Conclusions and Future Directions .....                                 | 51  |
| References .....  | 78  |
| Appendix A .....  | 84  |
| Appendix B .....  | 89  |

## List of Tables

|  |    |
|--|----|
| Table 1. <i>Frequency of reports from 2012-2015, stratified by report status/number in 2011</i> .....  | 54 |
| Table 2. <i>Correlations among predictor variables</i> .....   | 55 |
| Table 3. <i>Model fit statistics for substantiation status latent class models</i> .....   | 56 |
| Table 4. <i>Percentage of child, caregiver, and case variables endorsed in 2011 report, by latent class</i> .....                            | 57 |
| Table 5. <i>Racial identities of sample, by latent class</i> .....   | 58 |
| Table 6. <i>Type of primary alleged maltreatment in initial 2011 report, by latent class</i> ....  | 59 |
| Table 7a. <i>Logistic regression coefficients and relative risk ratios of latent class membership, U + low as reference group</i> .....      | 60 |
| Table 7b. <i>Logistic regression coefficients and relative risk ratios of latent class membership, S + moderate as reference group</i> ..... | 61 |
| Table 7c. <i>Logistic regression coefficients and relative risk ratios of latent class membership, S + low as reference group</i> .....      | 62 |
| Table 8. <i>Frequency of service provision within overall sample, substantiated sample, and served sample</i> .....                          | 63 |
| Table 9. <i>Model fit statistics for service provision latent class models</i> .....   | 64 |
| Table 10a. <i>Logistic/linear regression coefficients for subsequent reports mediation model</i> .....                                       | 65 |
| Table 10b. <i>Indirect, direct, and total effects for subsequent reports mediation model</i> ....  | 66 |
| Table 11a. <i>Linear regression coefficients for subsequent substantiated reports mediation model</i> .....                                  | 67 |
| Table 11b. <i>Indirect, direct, and total effects for subsequent substantiated reports mediation model</i> .....                             | 68 |
| Table 12a. <i>Linear regression coefficients for foster care mediation model</i> .....   | 69 |
| Table 12b. <i>Indirect, direct, and total effects for foster care mediation model</i> .....  | 70 |

|   |    |
|---|----|
| Table 13. <i>Model fit statistics for service provision latent class models, subsample of substantiated cases</i> ..... | 71 |
| Table 14. <i>Means and standard deviations of number of reports from 2012 to 2015, by latent class</i> .....            | 72 |

## List of Figures

|   |    |
|---|----|
| Figure 1. <i>States retained in substantiation status latent class analysis</i> ..... | 73 |
| Figure 2. <i>States retained in service provision latent class analysis</i> .....     | 74 |
| Figure 3. <i>Latent classes of substantiation status</i> .....                        | 75 |
| Figure 4. <i>Latent classes of substantiation status, 2011 omitted</i> .....          | 76 |
| Figure 5. <i>Latent classes of service provision</i> .....                            | 77 |

## **Introduction**

The association between child maltreatment and negative health outcomes is well-established. Child maltreatment has been shown to predict a variety of health concerns in adulthood, including substance use, depression, and sexually transmitted diseases (Heckman, 2008), suicide attempts (Van Neil, Pachter, Wade, Felitti, & Stein, 2014), obesity and chronic pulmonary obstructive disease (Anda et al., 2008), autoimmune disease (Dube et al., 2009), diabetes and cardiovascular disease (Felitti et al., 1998), and premature mortality (Brown et al., 2009). Child maltreatment has also been found to predict poor educational, employment, and economic earning in adulthood (Currie & Widom, 2010). In addition to personal consequences, societal costs of child maltreatment are notable; the average lifetime cost for each victim of non-fatal child maltreatment is estimated at \$210,012 (Fang, Brown, Florence, & Mercy, 2012). This total is comprised primarily of lost productivity costs (\$144,360), as well as childhood health care, adult medical care, child welfare, criminal justice, and special education costs.

Child maltreatment is also associated with emotional and behavioral problems in childhood and adolescence, including anxiety and depressive symptoms (Lauterbach & Armour, 2016; McLeer et al., 1998; Nguyen, Dunne, & Le, 2010), antisocial behavior (Thibodeau, Cicchetti, & Rogosch, 2015), and aggression (Kotch et al., 2008), as well as broadband internalizing and externalizing problems (Heleniak, Jenness, Stoep, McCauley, & McLaughlin, 2016; Mills et al., 2013; Vachon, Krueger, Rogosch, & Cicchetti, 2015).

Childhood maltreatment is often studied using adult retrospective report or child report. These data can often be quickly and inexpensively acquired, but although the

reliability of retrospective report has some support (Dube, Williamson, Thompson, Felitti, & Anda, 2004), self-reports can be colored by bias. Evidence suggests that prospective studies capture incidences of childhood maltreatment that are not captured by retrospective report alone (Widom, Raphael, & DuMont, 2004; Widom & Shepard, 1996; Williams, 1994). Widom and Morris (1997) compared data from a prospective study to retrospective reports obtained from the same young adults twenty years later, and found that documented cases of childhood sexual abuse were self-reported by only 41-67% of women.

State administrative data acquired through Child Protective Services (CPS) departments contribute a degree of objectivity to the field. Shaffer, Huston, and Egeland (2007) examined retrospective and prospective reports of child maltreatment in a sample of high risk children who enrolled in a longitudinal study. Prospective reports were gathered at 16 time points throughout childhood via caregiver interview, review of CPS and medical records, and direct observation of interactions between caregivers and children. Retrospective reports were obtained from participants at age 19 years. Of the participants who experienced maltreatment, information was obtained exclusively from prospective report in 41% of cases, exclusively from retrospective report in 14% of cases, and from both prospective and retrospective report in 45% of cases. Clearly, a vast amount of information is lost with sole reliance on retrospective self-report. At the same time, a portion of self-reported maltreatment was not captured by prospective report, which demonstrates that administrative data are still limited by false negatives of maltreatment that is unreported or unconfirmed by CPS.

With the acknowledgement that rates reported from state data are almost certainly an underestimate of true prevalence rates, the lifetime prevalence rate of maltreatment investigations by CPS in the United States (US) is reported at approximately 37% (Kim, Wildeman, Jonson-Reid, & Drake, 2017). National data indicate that in 2015, approximately 4 million referrals pertaining to 7.2 children were made to CPS, resulting in 683,487 established victims of child maltreatment. (US Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, & Children's Bureau, 2017). Of these children, 29.5% had been identified as victims of maltreatment in prior years. Child maltreatment, and recurrent maltreatment in particular, is occurring at an alarmingly high rate.

### **Recurrent Contact with CPS**

Negative outcomes of maltreatment recurrence have been studied using CPS reports as indicators of maltreatment (English, Graham, Litrownik, Everson, & Bangdiwala, 2005; Jonson-Reid, Kohl, & Drake, 2012; Lanier et al., 2010). Specifically, number of CPS referrals has been found to predict negative physical outcomes, including hospital treatment for asthma, cardio-respiratory, or other infectious disease episodes in low-income children (Lanier et al., 2010- number of maltreatment reports), and health care for a head injury and sexually transmitted disease in childhood (Jonson-Reid et al., 2012). Research has also shown frequency of CPS reports to be associated with negative psychological outcomes, including externalizing problems (English et al., 2005), reception of a mental health diagnosis, emergency department treatment for a suicide attempt, delinquent petition for a violent offense, and treatment or delinquency petition for substance abuse (Jonson-Reid et al., 2012).

In the context of CPS reports, broadly, the term “recurrence” designates a subsequent contact with CPS after an initial contact, but the nature of CPS contact varies notably across published studies. When recurrence is defined as a subsequent report filed within one year of the first, studies have reported recurrence rates that range from 7% (US Department of Health and Human Services et al., 2017) to 16% (Fluke, Shusterman, Hollinshead, & Yuan, 2005). Rates of re-report within two years have ranged from 22% (Fluke, Shusterman, Hollinshead, & Yuan, 2008) to 24% (Fluke et al., 2005). This number increases with time, such that 32% (Fluke et al., 2005) to 46.2% (Jonson-Reid, Drake, Chung, & Way, 2003) of children reported to CPS are re-reported within five years, 62% within seven and a half years (Drake, Jonson-Reid & Sapokaite, 2006), and 67% within eight years (Proctor et al., 2012).

Alternatively, recurrence has also been defined as a subsequent *substantiated* report. The Child Welfare Information Gateway (2003, Introduction Section, para. 2) defines “unsubstantiated” as the appropriate designation when “[a)] an investigation determined that no maltreatment occurred or [(b)] insufficient evidence existed under state law or agency policy to conclude that the child was maltreated.” Substantiation status, therefore, does not necessarily represent a true estimate of maltreatment rates and is more accurately characterized by demonstration of evidence. When recurrence is defined in this narrower manner, rates are lower than they are for re-reports more generally: Waldfogel (2009) reported findings from the 2005 Federal Child and Family Services review (United States Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, & Children’s Bureau, 2005) that indicated that 6.6% of open CPS cases had another substantiated

maltreatment report within six months of case opening. Re-substantiation rates were also examined in a national, longitudinal study of children reported to CPS, with 5% and 7% of children having re-substantiated reports within one year and two years, respectively (Fluke et al., 2008).

### **Outcomes by Substantiation Status**

Substantiated reports are often selected to serve as an approximation of true maltreatment, but this method precludes the study of recurrence in the 79.7% of children (US Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, & Children's Bureau, 2017) whose initial reports are unsubstantiated, many of whom proceed to have subsequently substantiated referrals. During the past two decades, research has begun to overturn the previously held assumption that unsubstantiated reports pose minimal risk of negative outcomes. For example, Dakil, Sakai, Lin, & Flores (2011) found that among a sample of children remaining in the home after an unsubstantiated report, 56% had a subsequent report within five years, whereas after an initial substantiated report, 38% of children had a subsequent report within the same time frame. One reason for this may be that the percentage of children receiving post-investigation services is higher for children with substantiated reports (58.9%) than children with unsubstantiated reports (33.2%) (U.S. Department of Health and Human Services, 2017). In addition, substantiated reports led to foster care services for 21.7% of children, and 2.8% of children with unsubstantiated reports received these services. These data suggest that substantiated reports prompt increased service provision and minimize subsequent reports, but it would be a mistake to assume that children with unsubstantiated reports are at reduced risk of negative

outcomes. According to data collected in the National Survey of Child and Adolescent Well-Being II (Casanueva, Dolan, Smith, & Ringeisen, 2012), children with unsubstantiated reports experienced similar risk of behavioral, cognitive or language problems, emotional/behavioral problems, and substance use disorder as those with substantiated reports.

Further, Drake, Jonson-Reid, Way, & Chung (2003) examined the extent to which substantiation status predicted subsequent reports and subsequent substantiation. Likelihood of re-report did not differ overall based on initial substantiation status, although when particular types of maltreatment were isolated in analysis, substantiated allegations of neglect predicted re-report. Substantiation status of physical and sexual abuse allegations did not predict re-report. When recurrence was measured as subsequent *substantiated* reports, substantiated sexual abuse recurred at similar rates regardless of the initial report's substantiation status. Substantiated physical abuse was about 2.4% more likely for children whose initial reports were substantiated rather than unsubstantiated, and substantiated neglect was approximately 9.5% more likely for initially substantiated reports. In addition, Kohl, Jonson-Reid, and Drake (2009) demonstrated that risk of maltreatment recurrence within 36 months did not differ between groups whose initial reports were substantiated versus unsubstantiated.

### **A Call for Trajectory Prediction**

With mounting evidence supporting the limits of substantiation utility, methods of risk assessment must acknowledge the risk faced by children with unsubstantiated reports. The risk assessment instruments currently used by CPS aim to determine immediate threat of harm as well as future risk of abuse or neglect. These areas of focus

are necessary in order for CPS to fulfill its mission of protecting children from abuse and neglect. Researchers have the luxury, as CPS workers do not, of flexibly expanding the lens of risk assessment to adopt a longitudinal perspective that expands the time duration and includes risk of future unsubstantiated reports. It is important to note that predictive assessments are only worthwhile when corresponding action can be taken to mitigate risk to those identified as high risk. Therefore, the value in predicting long-term patterns of CPS contact is dependent on an accompanying flexibility of service provision.

**Differential response.** Fortunately, in the past two decades, a new approach to service provision known as differential response has become increasingly implemented by CPS departments across the US. Differential response allows for two tracks: investigation or alternative response tracks (National Quality Improvement Center, 2011). Both tracks include child risk assessments, and the alternative response track also includes an assessment of each family's strengths and needs and provision of appropriate services; this assessment may or may not be included in the investigation track. Differential response has allowed CPS to expand its service provision beyond merely those families whose maltreatment reports were substantiated. Until funding allows for universal and proactive family support services, efficient use of services initiated through CPS will require identification of families at highest risk for recurrent CPS referrals. Although this type of risk screening can seem a daunting task in the field of child welfare, our society supports screenings in domains of physical health and reaps the benefits of doing so. As Vaithianathan, Maloney, Putnam-Hornstein, and Jiang (2013) reflected, the prevalence rate of substantiated maltreatment for children younger than five years is more than 20 times the risk of breast cancer in women ages 50-60 years who are

offered screening, but no similar global screening for maltreatment risk is consistently conducted.

Drake and colleagues (2003) reported that over 75% of children removed from their parents' custody had an unsubstantiated initial report. Intervention upon a family's first contact with CPS, regardless of substantiation status, is currently an underutilized opportunity for prevention of subsequent maltreatment. The proposition to intervene after an initial report prompts an important question: is a certain degree of involvement with CPS "safe", or is any contact with CPS predictive of increased risk for negative outcomes? Jonson-Reid and colleagues (2012) compared outcomes based on number of CPS reports and found that children with no reports and children with one report showed no significant differences in rates of maltreatment perpetration or substance use in adulthood, suggesting that prevention efforts after one report may have strong merit in reducing negative outcomes in adulthood. In order to study the best means and timing of intervention, we must first gain a better understanding of the common trajectories of CPS referrals that children follow, as well as the risk factors that predict such trajectories.

### **Latent Class Analyses**

In the past several years, a few researchers have studied patterns of CPS involvement using latent class analysis (LCA) (Havlicek, 2014; Eastman, Mitchell, & Putnam-Hornstein, 2016). LCA allows for identification and study of a priori unknown subpopulations within a heterogeneous group (Geiser, 2013). A strength of using this statistical approach with a CPS population is its ability to identify groups of individuals who share similar patterns of CPS contact over time. This extends beyond predicting whether or not a child will have a subsequent report and helps to predict an overall

pattern of timing, frequency, and substantiation status of reports (i.e., chronic, intermittent, increasing, or decreasing).

After these subpopulations have been identified, risk factors of the various groups can be determined. For example, Havlicek (2014) identified unobserved subpopulations of youth with distinct profiles of maltreatment. Maltreatment was assessed in regards to chronicity of maltreatment, type(s) of maltreatment (single or multiple) and number of perpetrators. Classes revealed the following subpopulations: chronically maltreated, situationally maltreated, predominantly abused, and predominantly neglected. Membership in the chronically maltreated class (the largest class) was predicted by age at first entry into out-of-home care and placement in traditional foster home.

In a recent study of CPS reporting patterns, Eastman and colleagues (2016) identified subpopulations of children in the state of California with distinct patterns of risk factors that predicted re-report between infancy and age five years. Four classes with varying risk levels emerged, with probability of re-report ranging from 44% to 75% according to class membership. Distinct classes of risk factors allowed the researchers to identify factors most strongly associated with re-report, including birth factors (lack of established paternity and delayed or absent prenatal care) as well as maltreatment report factors (history of CPS involvement with older sibling and an initial allegation of neglect).

**Predictors of latent classes.** Several prior studies have examined family characteristics that predict contact with CPS. Wekerle, Wall, Leung, & Trocmé (2007) examined many caregiver variables and found that although the strongest predictor of maltreatment substantiation was the number of caregiver risk factors endorsed, caregiver

substance abuse was the strongest single predictor of maltreatment substantiation.

Socioeconomic status (SES) has also emerged as a predictor of CPS contact: in a study of public benefits and child protection records of children living in New Zealand, researchers found that 83% of children who were substantiated for maltreatment by age five were enrolled in the public benefit system by age two (Vaithianathan et al., 2013). Further support for the role of SES has been demonstrated by two studies conducted by Sedlak and colleagues; the first found that child maltreatment rates were 25 times higher in families with a yearly income below \$15,000 compared to those with incomes above \$30,000 (Sedlak & Broadhurst, 1996), and the second reported maltreatment rates two to three times higher in families with unemployed parents compared to families with employed parents (Sedlak et al., 2010).

Race has also emerged as a variable associated with CPS contact. Lifetime prevalence of CPS investigation collapsed across races is 37.4%, but prevalence varies significantly by race. African American children have 53% lifetime prevalence, and Asians/Pacific Islanders have 10.2% lifetime prevalence (Kim et al., 2017). Similarly, prevalence of *confirmed* cases of maltreatment by age 18 differs across racial groups, as well, at 20.9% for African American children, 14.9% for Native American children 10.7% for white children, and 3.8% for Asian and Pacific Islander children (Wildeman et al., 2014). A common question in the field is to what extent the association of maltreatment with race is driven by SES or systemic biases and discrimination. These child and family characteristics, along with additional, less studied characteristics, warrant consideration and closer study in the prediction of long-term maltreatment trajectories.

## **Gaps in the Literature**

Thus far, LCA within the CPS realm has been used to identify classes based on family characteristics and type and timing of maltreatment. As of yet, LCA has not been used to identify subpopulations defined by the timing and recurrence rate of substantiated *and* unsubstantiated reports. Identification of latent classes would enable the study of differences in child, parent, and case characteristics across recurrence patterns. This information could enable service provision to be targeted towards those families that are most likely to have chronic or increasing interactions with CPS. That is, in addition to children in immediate danger, children who are not deemed at imminent risk of harm yet whose family and case characteristics predict recurring CPS contact could be offered services as an effort to prevent subsequent maltreatment or chronic patterns of subthreshold maltreatment. In addition, analysis of the services provided to families is an understudied area of great importance. The sheer number of different services available makes daunting the prospect of a cohesive study, and yet an understanding of effective services will be crucial for appropriately targeting services to families who will benefit from them.

Many of the previously discussed studies examined recurrence within one (U.S. Department of Health and Human Services, 2017; Fluke et al., 2005) or two years (Fluke et al., 2005, 2008), and therefore are not able to capture longer-term recurrence. Further study of longer durations is warranted to best characterize the frequency and substantiation profiles of families' contact with CPS. Finally, whereas much research has examined exclusively substantiated reports of maltreatment, patterns and risk factors of

unsubstantiated reports are far less explored, despite having been found to predict subsequent maltreatment.

### **The Current Study**

The current study aimed to use LCA to identify patterns of substantiated and unsubstantiated maltreatment allegations in children and adolescents over a five-year period. The inclusion of unsubstantiated reports enabled a unique examination of families who were at risk of subsequent reports, but some of whom had not experienced confirmed maltreatment. Risk factors were then examined in relation to class membership. In addition, the current study aimed to identify distinct patterns of post-investigation service provision and examine whether service provision mediated an association between substantiation status of initial report and maltreatment recurrence. This mediation was examined in the context of covariates that are often associated with maltreatment allegations.

### **Aims and Hypotheses**

*Aim 1:* To identify subpopulations of children with similar patterns of maltreatment reports over time

Hypothesis 1: The following four latent classes will emerge:

1. Chronic maltreatment (substantiated and unsubstantiated reports occur during all or almost all five years)
2. Remitted risk (substantiated and unsubstantiated reports occur in first year or two and not in subsequent years)
3. Late substantiation (chronic unsubstantiated reports, substantiated report occurs only in final years)

4. Isolated/false alarm incident (unsubstantiated report occurs in first year and remits, no substantiated reports)

*Aim 2:* To examine differences in child, caregiver, and case variables between latent classes

Hypothesis 2a: History of prior maltreatment will differ between classes.

Specifically, latent classes 1 and 2 will be more likely to have a previous substantiated maltreatment report than classes 3 and 4.

Hypothesis 2b: Income and substance abuse will significantly predict membership in classes characterized by chronic reports, whether substantiated or unsubstantiated (classes 1 and 3).

Hypothesis 2c: Race will significantly predict membership in the substantiated classes (1, 2, and 3) such that African American children and Native American children will be more likely than White children and Asian/Pacific Islander children to belong to these classes.

*Aim 3:* To identify latent classes of post-investigation services provided to families

Hypothesis 3: This manner of conceptualizing service provision is relatively unexamined, and therefore largely exploratory. However, the following classes are expected to emerge:

1. No services
2. Financial services
3. Caregiver substance abuse services
4. Financial services + caregiver substance abuse services

5. Mental health services (caregiver + child)
6. Financial, substance abuse, and mental health services

*Aim 4:* To examine the mechanism through which substantiation status may influence recurrent maltreatment

Hypothesis 4: It is expected that initial report substantiation status will predict each of three maltreatment outcomes, all measured from 2011-2015, including (1) total number of subsequent reports, (2) total number of subsequent substantiated reports, and (3) total number of foster care placements. Latent class membership of service provision will partially mediate these associations.

## **Methods**

### **Participants**

Data for the proposed study were obtained from the National Child Abuse and Neglect Data System (NCANDS) Child Files for the years 2011 to 2015. These NCANDS Child Files contain data regarding all CPS referrals that were accepted for investigation and received a disposition decision during the stated time frame. Due to the longitudinal aims of this proposal, only children with a report in 2011 were included. Data from children who were included in one or some of the latter 2012 to 2015 Child Files but whose initial CPS contact occurred after 2011 were not retained. The proposed analyses aim to assess data regarding these children for a five year period. Therefore, child age was restricted to less than thirteen years to allow for five years of follow up without children aging out of CPS after turning 18. The sample was further refined by retaining data only from states whose ID assignment method allows for linking data sets across the five years included in this study.

The full 2011 Child File contained 3,655,951 child-report pairs and 3,046,606 unique children ( $M = 7.51$  years old,  $SD = 5.11$  years, 49.8% female). The majority (60.9%) of children were reported as White, and 25.8% as Black or African American, 1.9% as American Indian or Alaska Native, 1.3% as Asian, 0.4% as Hawaiian or Other Pacific Islander, and race data was either undetermined or otherwise not reported for 8.8% of children. Some children (3.6%) were reported as identifying with more than once race. Hispanic or Latino/a ethnicity was endorsed for 21.4% of children, and ethnicity was undetermined or otherwise not reported for 20.1% of children. Living arrangements were not reported for many children (51.9%); for those whose living arrangement was reported, 43.2% were living with two parents, 34.2% with a single parent, 15.2% with one parent and another non-parent adult, and 7.0% with another caregiver (i.e., relative or non-relative caregiver, group home). Most children (65.6%) had not been prior victims of substantiated maltreatment, whereas 20.4% of children had been (14.0% missing data).

**Sample for substantiation status LCA.** After addressing the restrictions of age, missing data (outlined in Procedure), ID linking, and using a random approximately 50% split command in SPSS to generate two data files of nearly identical size, the resulting file contained 246,021 children ( $M = 5.31$  years old,  $SD = 3.68$  years, 49.0% female). States retained for this analysis are presented in Figure 1. The majority (66.1%) of children were reported as White, and 26.4% as Black or African American, 1.1% as American Indian or Alaska Native, 0.9% as Asian, 0.3% as Hawaiian or Other Pacific Islander, and race data was either undetermined or otherwise not reported for 6.1% of children. Race percentages exceed 100% because some children (3.3%) were reported as identifying with more than once race. Hispanic or Latino/a ethnicity was endorsed for

29.4% of children, and ethnicity was undetermined or otherwise not reported for 13.2% of children. Living arrangements were not reported for many children (50.6%); for those whose living arrangements were reported, 37.0% were living with two parents, 33.9% with a single parent, 21.9% with one parent and another non-parent adult, and 6.8% with another caregiver (i.e., relative or non-relative caregiver, group home). Most children (77.3%) had not been prior victims of substantiated maltreatment, whereas 21.7% of children had been (1.0% missing data).

**Service provision sample.** After addressing the restrictions of age, missing data (outlined in Procedure), ID linking, and using a random approximately 50% split command in SPSS to generate two data files of nearly identical size, the resulting file contained 509,816 children ( $M = 5.41$  years old,  $SD = 3.70$  years, 48.2 % female). States retained for this analysis are presented in Figure 2. The majority (68.7%) of children were reported as White, and 27.3% as Black or African American, 1.1% as American Indian or Alaska Native, 1.0% as Asian, 0.3% as Hawaiian or Other Pacific Islander, and race data was either undetermined or otherwise not reported for 8.7% of children. Race percentages exceed 100% because some children (3.5%) were reported as identifying with more than once race. Hispanic or Latino/a ethnicity was endorsed for 22.2% of children, and ethnicity was undetermined or otherwise not reported for 19.8% of children. Living arrangements were not reported for many children (50.8%); for those whose living arrangements were reported, 37.2% were living with two parents, 34.0% with a single parent, 21.9% with one parent and another non-parent adult, and 6.9% with another caregiver (i.e., relative or non-relative caregiver, group home). Most children

(77.3%) had not been prior victims of substantiated maltreatment, whereas 21.7% of children had been (1.0% missing data).

## **Measures**

**Case variables.** Case variables were reported by state CPS agencies based on current and prior referral characteristics. All child-report pairs included in this dataset received a disposition after investigation. Dispositions included substantiated and unsubstantiated determinations, and some states reported additional dispositions, including indicated maltreatment, intentionally false report, differential response victim, differential response non-victim, and closed with no finding. To increase comparability across states and because alternate response dispositions were quite rare, only those dispositions categorized as substantiated, unsubstantiated, and indicated were retained. Indicated dispositions represent those cases for which reasons for suspecting maltreatment existed but a substantiation was not made. In the current study, indicated dispositions were categorized as substantiated. For each year of the study (2011-2015), new dichotomous (yes/no) disposition variables were created from existing variables to indicate the presence of any substantiated report, any unsubstantiated report, only substantiated report(s), only unsubstantiated report(s), or both substantiated and unsubstantiated reports. In addition, a dichotomously coded (yes/no) variable indicating prior history of maltreatment substantiation was created. This variable was obtained at the time of first report for each child in 2011. Service provision variables are numerous and can be found, with their definitions, in Appendix A.

**Child variables.** Child variables included age, sex, and race of the child referred to CPS. All child variables were assessed at the time of the first report for each child in 2011.

**Caregiver variables.** Caregiver variables included the following variables: alcohol abuse, drug abuse, emotional disturbance (clinically diagnosed according to Diagnostic and Statistical Manual of Mental Disorders), domestic violence (interspousal physical or emotional abuse), inadequate housing (substandard, overcrowded, unsafe, including homelessness), financial problems (inability to provide sufficient financial resources to meet minimum needs), and public assistance (reception of any welfare or social services programs: i.e., Medicaid, SSI, food stamps, etc.). A new dichotomous (yes/no) poverty variable was created, with “yes” defined by endorsement at least of one of the following variables: financial problem, inadequate housing, and/or public assistance variable. Similarly, a new dichotomous (yes/no) “substance abuse” variable was created with “yes” defined by endorsement of either caregiver alcohol abuse or caregiver drug abuse. All variables were coded dichotomously (yes/no) by each respective state’s CPS agency workers to indicate whether at least one of the child’s caregivers was affected by each factor. All caregiver variables were assessed at the time of the first report for each child in 2011.

### **Procedure**

The proposed study has been deemed exempt from full review by the Institutional Review Board (IRB) at the University of Vermont. Data included in the proposed study were accessed from the following NCANDS Child Files: FFY 2011v1, 2012v1, 2013v1, 2014v1, and 2015v1. Combined, these files contain data collected between October 1,

2010 and September 30, 2015. These data were provided by the National Data Archive on Child Abuse and Neglect (NDACAN) at Cornell University, and have been obtained with permission. The data were originally collected under the auspices of the Children's Bureau. Funding was provided by the Children's Bureau, Administration on Children, Youth and Families, Administration for Children and Families, U.S. Department of Health and Human Services. The collector of the original data, the funding agency, NDACAN, Cornell University, and the agents or employees of these institutions bear no responsibility for the analyses or interpretations presented here. The information and opinions expressed reflect solely the opinions of the author.

Each year, prior to submitting data to NDACAN, state agencies map their existing data to match the data format and codes required for NCANDS submission. The NCANDS Technical Team reviews submitted files and provides feedback for improved data mapping to ensure that annual data pass NCANDS validation checks. This often results in an iterative process until the final data file is validated and accepted. Files from years 2010/2011 to 2014/2015 were merged to enable longitudinal study.

### **Data Analyses**

**Latent class analyses of CPS contact.** Latent Class Analysis (LCA) is used to identify homogenous subpopulations within a larger sample. LCA aims to determine the fewest number of classes that support independence of variables within each class, such that the latent variable accounts for associations between observed variables (Havlicek, 2014; McCutcheon, 1987). Latent classes were computed using Mplus Version 7.31 (Múthen & Múthen; 2012) to identify groups with distinct patterns in timing, frequency, and substantiation status over the course of five years. Variables entered into the LCA

included dichotomous variables indicating whether each child had any substantiated (yes/no) or only unsubstantiated report(s) (yes/no) during the given year. Variables for each of the five years were included. Low Bayesian Information Criteria (BIC), sample size-adjusted BIC (adjBIC), Lo, Mendell, Rubin (LMR) adjusted likelihood ratio test (LRT), Vuong, Lo, Mendell, Rubin LRT, entropy, and substantive theory were examined to determine model fit. As number of classes increased, models were deemed better fitting if the model with more classes had lower BIC and adjBIC values while also remaining substantively plausible and meaningfully distinct from other models.

**Predictors of latent class membership.** A variable indicating most likely latent class membership was calculated, saved, and entered as a dependent variable into a multinomial logistic regression run in Mplus. Independent predictors included child demographic variables (age, sex, and race), caregiver variables (substance abuse, emotional disturbance, domestic violence, poverty), and prior history of substantiated maltreatment.

**Latent class analyses of service provision.** LCA was used to identify subpopulations with distinct patterns of services provided through CPS. Decision criteria as outlined above were utilized to determine the number of classes in the best-fitting model.

**Mediating effect of service provision.** Subsequently, three separate linear regressions were conducted to determine the extent to which substantiation status of the first report (in the 2011 data file) predicted three variables related to maltreatment recurrence across the 2010/2011 to 2014/2015 data files: (1) total number of subsequent reports, (2) total number of subsequent substantiated reports, and (3) number of distinct

years in foster care. Child age, gender, race, and poverty were entered as covariates. After establishing significant associations, the variable denoting most likely service provision latent class membership was added into the model as a mediating variable. Mediation analyses were conducted using maximum likelihood estimator in Mplus to allow for use of the logistic regression model, as dictated by the categorical nature of the mediating variable (Múthen, Múthen, & Asparouhov, 2016).

**Split-half.** To examine the replicability of findings within this specific sample, half of the sample was randomly selected as the initial sample, and the other half served as the validation sample. Latent class analyses, regressions, and mediation analyses were conducted using both samples to assess consistency of results within this data set.

### **Missing Data**

Missing data rates were high for some states whose laws precluded the reporting of certain variables. For the substantiation status analyses, in order to ensure adequately low rates of missing data on these variables while also avoiding within-state bias, state exclusionary criteria were established. Only states with less than 10% missing data on at least seven of the eight child/caregiver/case variables of interest were retained for the substantiation status analyses. The resulting data file showed acceptable rates of missing data on all risk variables of interest: caregiver substance abuse = 0.1%, poverty = 0.1%, domestic violence = 6.6%, caregiver emotional disturbance = 2.2%, child sex = 0.5%, prior victimization = 9.9%, child age = 0.0%, child race = 5.6%. The data file also showed low rates of missing data on substantiation status variables used in the latent class analysis, with 4.1% missing for 2011 variables and 0.0% missing for 2012 through 2015 variables.

Missing values on the prior victimization variable were more likely for children affected by poverty, older children, and children of American Indian or Alaska Native race or Black or African American race. Missing values on this variable were less likely for children of Asian American race, Native Hawaiian or Pacific Islander race, and White race and for children with caregivers who abused substances. The majority of missing values for prior victimization occurred in data submitted from two states: Georgia and North Dakota. This likely accounts for the finding that Black or African American children had a high rate of missing prior victimization data, as Georgia had the highest percentage of Black or African American children of all retained states.

States were retained for the service provision latent class analysis if they had less than 10% missing on the post-investigative services variables (yes/no). This variable did not convey a particular type of service, but rather, the provision of any of the services queried in the NCANDS data file. Missing data rates were low for the outcome variables used in these analyses: total number of subsequent reports = 0%, total number of subsequent substantiated reports = 2.3%, total years in foster care from 2012-2015 = 0%. Missingness on total number of subsequent substantiated reports was perfectly predicted by missingness of 2011 initial report, because the calculation of *subsequent* substantiated reports required knowledge of the substantiation status of the first report. ML estimation with bootstrapped standard errors was used to provide non-symmetric confidence intervals to address the non-normal sampling distributions and missing data. ML with bootstrapping uses full information maximum likelihood, the algorithm for which handles any pattern of missing data (Little & Rubin, 2002).

## Results

### Patterns of CPS Contact

**Case variables descriptive statistics.** Of all children in this subsample with an investigated report in 2011 ( $n = 246,021$ ), 31.3% had at least one substantiated report, and 72.9% had at least one unsubstantiated report. 68.7% of children had *only* unsubstantiated reports in 2011, and 27.1% had *only* substantiated reports. A small percentage of children (4.1%) had both unsubstantiated and substantiated reports in 2011. Frequency of reports in years 2012 to 2015 are presented in Table 1, stratified by report status in 2011. Compared to having just one type of report in 2011, children with both types in 2011 were more likely to have subsequent substantiated reports in 2012, 2013, 2014, and 2015 (all  $p < .01$ ). Those with both types of reports in 2011 were less likely to have subsequent unsubstantiated reports in 2012 ( $p < .01$ ), more likely to have unsubstantiated reports in 2015 ( $p < .01$ ), and showed no difference in likelihood of unsubstantiated reports in 2013 or 2014 ( $p > .05$ ). Tables demonstrating transitions between substantiation statuses across years are presented in Appendix B.

The most frequent type of primary alleged maltreatment coded in initial 2011 reports was neglect (55.5%), followed by physical abuse (25.1%), sexual abuse (8.1%), “no alleged maltreatment” (7.8%), and psychological abuse (3.5%). These rates differed by gender,  $\chi^2(7) = 2003.65$ ,  $p < .001$ , most drastically with regards to physical abuse (males = 26.0%, females = 21.6%) and sexual abuse (males = 5.0%, females = 9.0%). Rates of substantiation of first report in 2011 were highest for psychological abuse (39.5%) and neglect (32.2%), followed by sexual abuse (27.1%), and physical abuse (19.4%).

**Demographic characteristics.** Correlations among child, caregiver, and case predictors can be found in Table 2. Endorsement of particular risk variables differed significantly based on caregiver substance abuse. Overall, 15.7% of children had a caregiver who abused substances. Domestic violence was almost three times more common in homes marked by caregiver substance abuse (28.5%) compared to homes with no caregiver substance abuse (11.0%),  $\chi^2(1) = 923.33, p < .001$ . Likelihood of caretaker with an emotional disturbance was over four times as high in homes with substance abuse (14.3%) versus homes without substance abuse (2.9%),  $\chi^2(1) = 1062.65, p < .001$ . The NCANDS codebook indicates that “emotional disturbance” is specific to a mood disorder rather than any disorder in the DSM, so this association likely indicates comorbidity rather than substance abuse being captured by both variables. Further, poverty was much more likely in families with a caregiver who abused substances (57.9%) compared to families without a caregiver who abused substances (18.7%),  $\chi^2(1) = 3094.36, p < .001$ . Likelihood of having had a prior substantiated report was also higher for children with a caregiver who abused substances (48.1%) compared to families without a caregiver who abused substances (34.3%),  $\chi^2(1) = 289.78, p < .001$ .

Endorsement of these risk variables also differed significantly based on poverty status. Overall, 24.9% of families were affected by poverty (as defined by endorsement of financial problems, inadequate housing, and/or public assistance). Families affected by poverty, as compared to families not affected by poverty, were over twice as likely to experience domestic violence (24.1% versus 10.3%, respectively,  $\chi^2(1) = 797.96, p < .001$ ), over five times as likely to have a caregiver with an emotional disturbance (11.9% versus 2.2%, respectively,  $\chi^2(1) = 1113.41, p < .001$ ), and more likely to have had a prior

substantiated report of child maltreatment (41.7% versus 34.8%, respectively,  $\chi^2(1) = 110.15, p < .001$ ). Caregiver substance abuse was also much more likely for children affected by poverty (36.6%) than children not affected by poverty (8.8%),  $\chi^2(1) = 3094.36, p < .001$ .

Rates of children affected by poverty varied by race and ethnicity as well. Percentage of children affected by poverty was highest for American Indian or Alaska Native children (47.1%), with more similar rates of poverty for White children (25.8%), Native Hawaiian or Pacific Islander children (22.6%), Black or African American children (21.4%), and Asian American children (21.1%). Children of Hispanic or Latino/a ethnicity were more likely to live in poverty (35.4%) than those of non-Hispanic or Latino/a ethnicity (24.2%),  $\chi^2(1) = 342.51 p < .001$ .

Rates of children living with caregivers who abused substances also varied by race and ethnicity. Percentage of children who abused substances was highest for American Indian or Alaska Native children (35.1%), with moderate rates for White children (14.8%), and lower rates for Native Hawaiian or Pacific Islander children (8.6%), Black or African American children (9.5%), and Asian American children (6.7%). Rates of caregiver substance abuse were higher in children of Hispanic or Latino/a ethnicity (16.7%) than those of non-Hispanic or Latino/a ethnicity (13.0%),  $\chi^2(1) = 533.41, p < .001$ .

**Latent class analyses.** Variables denoting any substantiated report (yes/no) and only unsubstantiated report(s) (yes/no) for each of the five years were entered into the latent class analysis, resulting in ten variables. Based on the predicted four-class solution, models estimating one-class through four-class solutions were assessed in Mplus using

ML estimation with robust standard errors. Model comparison between the varying class solutions was based on BIC values, LMR adjusted LRT, VLMR LRT, entropy, and substantive theory. Although the five-class model demonstrated decreased AIC, BIC, and sample-sized adjusted BIC values relative to the four-class model, as well as significant LMR adjusted LRT and VLMR LRT, the fifth class extracted was very small (4.5% of population), differed only slightly from another existing class, and was not meaningful for interpretation. The four class model demonstrated meaningfully distinct classes and good fit statistics. In regards to entropy, typically values approaching 1 indicate a high degree of certainty that individuals are indeed classified into their most likely latent class, whereas lower values suggest individuals of a particular class are also likely to be classified in a different class (Geiser, 2013). Review of the average latent class assignment probabilities demonstrated an adequate degree of certainty of class assignment in the four-class model (Class 1 = .83, Class 2 = .84, Class 3 = .85, Class 4 = .79). For all of these reasons, the four-class model was selected as the best fitting model that maintained meaningfully distinct classes.

**Characteristics of latent classes.** LCA model fit statistics are shown in Table 3. The four classes that emerged are shown in Figures 3 and 4. Class titles were derived based on researcher interpretation of the pattern of conditional probabilities across items. Class 1 is comprised of children with only an unsubstantiated report in 2011 who demonstrated moderate rates of report recurrence from 2012-2015 (U + moderate; 15.8%). Class 2 is comprised of children with a substantiated report in 2011 and low rates of report recurrence from 2012-2015 (S + low; 19.8%). Class 3 is comprised of children with a substantiated report in 2011 and moderate rates of report recurrence from 2012-

2015 (S + moderate; 10.2%). Class 4 is comprised of children with only an unsubstantiated report in 2011 and low rates of report recurrence from 2012-2015 (U + low; 54.2%). Family characteristics across latent classes are shown in Table 4, and racial distribution across latent classes is presented in Table 5. In each child's initial 2011 report, up to four types of maltreatment were recorded, though most reports only noted one type of maltreatment (77.4%). Type of primary maltreatment by latent class is presented in Table 6.

**Predictors of latent classes.** To assess the degree to which family and case characteristics predicted latent class membership, Mplus was used to run a multinomial logistic regression model that included most likely class membership as the outcome variable. Predictor variables included child age, sex, and race, caregiver substance abuse, caregiver emotional disturbance, domestic violence, poverty, and prior history of substantiated maltreatment, as coded at time of first report in 2011. All variables except for child age were coded 1 = yes, 0 = no. Dummy variables were created for child race with White race as the reference category (represented when all other dummy variables are coded 0). Child age was entered as a continuous independent variable (range = 0-12 years). The multinomial logistic regression was first completed using the U + low class as the reference group (Table 7a), then subsequently with the S + moderate (Table 7b) and S + low (Table 7c) classes as reference groups to enable comparisons between all groups. Due to large sample size, many regression coefficients and relative risk ratios were statistically significant but not meaningfully large effects. For this reason, a more stringent significance threshold ( $p < .01$ ) was utilized in the reporting of these data.

As predicted, children with a prior history of substantiated maltreatment were more likely to be in substantiated classes than unsubstantiated classes. Prior victimization also predicted membership in classes marked by recurrence compared to classes that demonstrated remitted risk. Contrary to the hypothesis that caregiver substance abuse would predict chronicity of reports, it was a much stronger predictor of initial substantiation status (in 2011) than recurrence. Although it was hypothesized that caregiver poverty would predict chronic recurrence, it, too, was a stronger predictor of initial substantiation status than recurrence. However, when comparing two classes within the same type of initial substantiation (U + moderate versus U + low, S + moderate versus S + low), caregiver poverty increased likelihood of membership in a recurring class. No prediction was made regarding domestic violence, but this variable emerged as a very strong predictor of initial substantiation status, such that children whose caregivers experienced domestic violence were more likely to have their initial report substantiated than those who did not.

Finally, it was expected based on prior research that Black or African American race and American Indian or Alaska Native race would predict membership in substantiated classes. This was found to be true within the low recurrence classes, (S + low versus U + low) for American Indian or Alaska Native children, and true within the moderate recurrence classes (U + moderate versus S + moderate) for Black or African American children. Within the same substantiation classes (S + low versus S + moderate, U + low versus U + moderate), American Indian or Alaska Native children were more likely to have low than moderate recurrence, whereas Black or African American children were more likely to have moderate than low recurrence. Asian American race

emerged as a strong predictor of low maltreatment recurrence, though did not distinguish between classes with initial substantiated versus initial unsubstantiated reports.

**Split half reliability analysis.** Analysis of a separate, approximately equal sized sample (validation sample) revealed very consistent results. Size and nature of latent classes and relative risk (RR) values from the multinomial logistic regressions were compared between the initial and validation samples. The same pattern of latent classes emerged and sample size of each latent class was consistent within one tenth of a percentage point to sample sizes in the initial sample. Logistic regression coefficients were also quite similar. Of the 66 logistic regression coefficients, four demonstrated differences in whether the effect exceeded a significance threshold of .01. The initial sample demonstrated a significant effect of Black or African American race distinguishing between the U + moderate class and the S + moderate class (RR = 0.94), whereas the validation sample did not (RR = 0.98). The initial sample also showed a significant effect of Black or American race when distinguishing between the S + low class and the S + moderate class (RR = 0.93), whereas the validation sample did not (RR = 0.99). The initial sample did not demonstrate a significant effect of emotional disturbance distinguishing between the U + moderate class and the S + low class (RR = 1.02), whereas the validation sample did (RR = 0.89). In addition, the initial sample showed a significant effect of age when distinguishing between the U + moderate class and the S + low class, whereas the validation sample did not, despite a RR of 1.01 in both samples.

Given the null to minimal difference in relative risk ratios in each case and proximity of RR values to 1, the discrepancies do not raise notable concern about

interpretation or implications of results. In none of the above cases did change in relative risk ratio affect interpretation of a variable as a strong, meaningful predictor of latent class.

### **Service Provision Analyses**

**Rates of service provision.** Overall in this sample, 18.3% of children received services. Children with substantiated initial reports were more likely to receive services (48.7%) than those with an initial unsubstantiated report (8.9%),  $\chi^2(1) = 95935.70, p < .001$ . Children who received services were significantly younger ( $M = 4.80, SD = 3.76$ ) than children who did not receive services ( $M = 5.54, SD = 3.67$ ),  $t(136909) = 54.87, p < .001$ . Children with caregivers who abused substances were more likely to receive services (37.1%) than children without caregivers who abused substances (19.1%),  $\chi^2(1) = 5423.05, p < .001$ . Surprisingly, children affected by poverty were less likely to receive services (15.2%) than children not affected by poverty (17.4%),  $\chi^2(1) = 392.23.70, p < .001$ .

Rate of service provision was highest for Native Hawaiian or Pacific Islander children (29.3%), followed by American Indian or Alaska Native children (24.1%), Black or African American children (20.4%), Asian American children (20.1%), and White children (18.5%). This pattern almost perfectly followed the pattern of substantiation frequency by race (Native Hawaiian or Pacific Islander = 33.4%; American Indian or Alaska Native = 30.2%; Asian American = 25.9%; Black or African American = 25.0%; White = 23.9%) and is likely largely driven by those effects. The services provided most frequently were case management (13.5%), foster care (7.1%), family preservation (6.7%), information and referrals (6.4%), and counseling (5.1%). Frequency of specific

services provided within the overall sample, a subsample of children with substantiated reports, and a subsample of children who received services are presented in Table 8.

**Latent class analysis of service provision.** Model comparison between the varying class solutions was based on Bayesian Information Criterion (BIC) values, Vuong-Lo, Mendell, Rubin Likelihood Ratio Test (VLMR LRT), Lo, Mendell, Rubin (LMR) adjusted LRT, entropy, and substantive theory. The fit statistics for one through three class models are presented in Table 9, and each class' conditional response probabilities for the various service variables are presented in Figure 5. Although BIC values and entropy statistics showed good fit up to a three-class model, VLMR and LMR LRT values were not significant when comparing the three- and two- class models. For this reason, the two-class model was selected as the best fitting model, resulting in a model with far fewer latent classes than hypothesized.

**Characteristics of latent classes.** The two-class model resulted in a dichotomous presentation of service provision, as it included a class of children who received services and a class of children who received no services. The class of children who received services was the smaller class (12.6% of sample) and was characterized by high probability ( $> .75$ ) of case management services and moderate probability ( $> .25$ ) of counseling, substance abuse, information/referrals, family preservation, foster care, juvenile petition, court-appointed representative, and "other" services. The class of children who did not receive services was the larger class (87.4% of sample) and was comprised of children with a very low probability of receiving any services.

The latent class of children who received services had a lower mean age ( $M = 4.87$ ,  $SD = 3.79$ ) than the class who did not receive services ( $M = 5.48$ ,  $SD = 3.68$ ),

$t(81657) = 38.46, p < .001$ . Both classes were 48.5% female. The service class demonstrated lower rates of poverty (28.2%) than the no service class (44.3%),  $\chi^2(1) = 4822.51, p < .001$ , whereas the service class demonstrated higher rates of caregiver substance abuse (31%) than the non-service class (11%),  $\chi^2(1) = 9610.04, p < .001$ . The service class was slightly less likely to have had prior reports (21%) than the non-service class (22%)  $\chi^2(1) = 75.30, p < .001$ . The service class was more than twice as likely to have had an initial substantiated report (55%) than the non-service class (19%),  $\chi^2(1) = 38063.54, p < .001$ , and less likely to have had any unsubstantiated report in 2011 (50%) than the non-service class (83%),  $\chi^2(1) = 33902.36, p < .001$ .

**Path analyses.** Mplus was used to conduct three separate path analyses, with substantiation status of initial report as the independent variable and dependent variables of (1) number of subsequent reports from 2011-2015, (2) number of subsequent substantiated reports from 2011-2015, and (3) number of distinct years in foster care (2012-2015). Years in foster care were only calculated from 2012 to 2015, and excluded year 2011, to avoid doubly accounting for foster care services (which are coded as service provision and included in the service provision LCA) in both the mediating and dependent variables. Number of years in foster care represents the number of different years in which the child was in foster care for at least some period of time, rather than number of consecutive months or years in foster care. After the linear regressions revealed significant associations between substantiation status of initial report and number of subsequent reports ( $B = .04, SE = .01, 95\% CI = .03 \text{ to } .05, p < .001$ ), number of subsequent substantiated reports ( $B = -.08, SE = .01, 95\% CI = -.08 \text{ to } -.07, p < .001$ ), and number of years in foster care ( $B = -.02, SE = .00, 95\% CI = -.02 \text{ to } -.02, p < .001$ ),

subsequent mediation models were run with latent service class as the mediating variable (1 = service class , 2 = no service class). Maximum likelihood (ML) estimation with bootstrapped standard errors and bootstrap-based confidence intervals was used to allow for logistic regression of the mediator on substantiation status of initial report and covariates, as well as to account for non-normality of the effect distribution due to the binary mediator and positively skewed dependent variable (Muthén, 2011). Child age, sex (1 = male, 2 = female), caregiver poverty (1 = yes, 2 = no), and dummy coded child race (1 = yes, 2 = no, White race as reference group) were included as covariates.

**Mediation model with total subsequent reports as outcome.** A path analysis was conducted to examine whether service provision latent class membership mediated the association between substantiation status of initial report and number of subsequent reports. Table 10a presents coefficients from the logistic regression (latent class mediator regressed on substantiation status) as well as from the linear regression (number of subsequent reports regressed on substantiation status, covariates, and latent class). Indirect/direct/total effects are presented in Table 10b. The positive coefficient for latent class regressed on substantiation status of initial report indicates that children with an initial substantiated report had a 5.81 times greater probability of being in the services class than the no services class. Several covariates also significantly predicted latent class membership. Contrary to expectations, children in the services class showed more subsequent reports than children in the no services class. With latent class membership included in the model, children with a substantiated initial report in 2011 had fewer subsequent reports than those with an unsubstantiated initial report. The significant indirect effects indicates that through its influence on latent class membership,

substantiation of initial report predicts an increase in subsequent reports. This indirect effect is opposite in direction from the direct effect, and results in a total effect ( $B = 0.05$ ,  $SE = 0.01$ , 95%  $CI = 0.03$  to  $0.07$ ,  $p < .001$ ) that is smaller than the direct effect. These results support the hypothesis that latent class membership would partially mediate the association between substantiation status of the initial report and the subsequent number of reports.

**Mediation model with total subsequent substantiated reports as outcome.** A second path analysis was conducted to examine whether service provision latent class membership mediated the association between substantiation status of initial report and number of subsequent *substantiated* reports. Because only the dependent variable differed from the first mediation model, path estimates from the logistic regression of latent class on substantiation status of initial report remained consistent with those in the prior model and can be found in Table 10a. Path estimates from the linear regression (number of subsequent substantiated reports regressed on substantiation status of initial report, covariates, and latent class) are presented in Table 11a, and indirect/direct/total effects are presented in Table 11b. Children in the service class had more subsequent substantiated reports than children in the no service class. A significant direct effect also emerged, such that an initial substantiated report was associated with more subsequent substantiated reports.

A statistically significant, though small, indirect effect was also revealed, indicating that through its influence on latent class membership, substantiation of initial report predicts a very small decrease in subsequent substantiated reports. As the direct effect of initial substantiation status on number of subsequent substantiated reports in the

mediation model is smaller than the same effect in the model without a mediator, these results support the hypothesis that latent class membership would partially mediate the association.

**Mediation model with total distinct years in foster care as outcome.** A third path analysis was conducted to examine whether service provision latent class membership mediated the association between substantiation status of initial report and number of years in foster care. Path estimates from the logistic regression of class on substantiation status of initial report and covariates have been previously reported (Table 10a). Path estimates from the linear regression (number of years in foster care regressed on substantiation status of initial report, covariates, and latent class) are presented in Table 12a and indirect/direct/total effects are presented in Table 12b. Membership in the latent class that received services was associated with an increase in years in foster care. A small, significant direct effect also emerged such that an initial substantiated report was associated with more years in foster care. A significant indirect effect demonstrated that through its influence on latent class membership, substantiation of initial report predicted a small increase in number of years in foster care. As the direct effect of initial substantiation status on number of years in foster care in the mediation model is smaller than the same direct effect in the model not considering a mediator, these results support the hypothesis that latent class membership would partially mediate the association.

**Split-half reliability analysis.** Analysis of a separate, approximately equal sized sample (validation sample) revealed very consistent results. The same pattern of latent classes emerged and sample size of each latent class was consistent within one percentage point between the initial and validation samples (service class = 12.6% versus

13.4%, no service class = 87.4% versus 86.6%, respectively). Coefficients for recurrence variables, including (1) number of subsequent reports (2) number of subsequent substantiated reports, and (3) years in foster care, regressed on substantiation status of initial report were consistent within one hundredths place between the initial sample and validation sample. Mediation models were also very consistent, with all effects consistent within two tenths except for four differences in findings. First, in the validation sample, Native Hawaiian or Pacific Islander race demonstrated a weaker, though still significant, effect on latent class (validation sample:  $B = 0.50$ ,  $SE = 0.09$ ,  $p < .001$ ; initial sample:  $B = 0.65$ ,  $SE = 0.09$ ,  $p < .001$ ). Second, the validation sample showed a non-significant effect of American Indian or Alaska Native race on number of subsequent reports ( $B = -0.04$ ,  $SE = 0.03$ ,  $p = .11$ ), whereas the initial sample showed a significant effect ( $B = -0.12$ ,  $SE = 0.03$ ,  $p < .001$ ). Third, the validation sample showed a significant effect of Black or African American race on number of subsequent substantiated reports ( $B = -0.01$ ,  $SE = .00$ ,  $p < .01$ ) whereas the effect was non-significant in the initial sample ( $B = 0.00$ ,  $SE = 0.00$ ,  $p = .09$ ). Finally, the effect of child sex was right above the  $p < .01$  threshold in the validation sample ( $B = 0.01$ ,  $SE = 0.00$ ,  $p = .01$ ), but statistically significant in the initial sample ( $B = 0.01$ ,  $SE = 0.00$ ,  $p < .001$ ). Although the effects of Black or African American race and child sex differed in significance levels across samples, all effect differences were very small and not theoretically meaningful.

**Latent class analysis of service provision in substantiated cases.** Post-hoc analyses included examination of latent classes of service provision within a subsample of cases in which maltreatment was substantiated. This subsample included 118,008 children (50.9% female) with a mean age of 4.93 years ( $SD = 3.76$ ). The most commonly

identified type of alleged maltreatment was neglect (58.0%), followed by physical abuse (15.2%), sexual abuse (6.3%), and psychological maltreatment (1.1%). Service provision was reported for 48.7% of this subsample, as opposed to 12.6% of the overall sample. Models estimating one-class through six-class solutions were assessed in Mplus using ML estimation with robust standard errors. Model comparison between the varying class solutions was based on Bayesian Information Criterion (BIC) values, Lo, Mendell, Rubin adjusted likelihood ratio test, entropy, and substantive theory. A significant Lo, Mendell, Rubin (LMR) adjusted LRT value emerged when progressing from a k-1 model to a k model from one through six classes. Although a six-class model demonstrated adequate fit (Table 13), the sixth class was not meaningfully distinguished from another class that was captured by the five class model. Thus, the five-class model was selected. The following classes were represented: (1) resources, treatment, and family preservation (2) resources, treatment, and foster care, (3) foster care (4) no services, and (5) counseling and family preservation. Number of subsequent reports by latent class are presented in Table 14.

## **Discussion**

### **Latent Classes of Substantiation Status**

The latent classes that emerged from the best fitting model bore similarities to the hypothesized classes in regards to their inclusion of chronic and “false alarm” classes, though they did not show distinct patterns of increasing and decreasing reports. The two classes with moderate recurrence showed parallel patterns of unsubstantiated and substantiated recurrence from 2012-2015, with both showing higher likelihood of unsubstantiated reports than substantiated reports. This general pattern maps well onto

prior findings that children are at highest risk for report recurrence within the first year after an initial report, and less so as more time passes. Contrary to hypotheses that a “late substantiation” class would emerge, in which children experienced chronic unsubstantiated reports and substantiation only in the final year or two, in all four of the classes that emerged, the likelihood of unsubstantiated and substantiated reports trended in the same (downward) direction from 2011-2015. It is possible that low rates of substantiated reports in subsequent years (3.7% in 2014, 3.2% in 2015) did not allow for the detection of a unique class defined by this profile, and led such children to be categorized into one of the resulting classes.

The unsubstantiated and low recurrence class was by far the largest in size and included over 50% of the sample. However, of the children with an initial unsubstantiated report, nearly one quarter were categorized into the unsubstantiated and moderate recurrence class, which emphasizes the need for services to be extended to families with unsubstantiated reports in addition to the families with substantiated reports. Of the children in moderate recurrence classes, about 50% more had an initial unsubstantiated report compared to an initial substantiated report. This difference is most likely driven by a higher base rate of unsubstantiated reports compared to substantiated reports. The large number of children in this group underlines the potential impact of allocating appropriate attention and resources to these families, who are as likely to experience recurrent maltreatment as those in the substantiated and moderate recurrence class.

The substantiated and low recurrence class was the second largest class, incorporating approximately 20% of the sample. This class could, in theory, represent the beneficial effects of interventions preventing further maltreatment. However, this

interpretation is rendered unlikely because in this sample, the substantiated class with low recurrence had a very low rate of service reception (2.0%), whereas 15.7% of the substantiated class with moderate recurrence received services. Although foster care could be a potential means by which low recurrence is achieved (either in concert with effective services and reunification, or due to minimal contact between children and alleged perpetrators), none of the children categorized in the substantiated with low recurrence class entered foster care in 2011. Thus, the low recurrence in this class of children cannot be conclusively attributed to a positive response to services. However, it is possible that case workers were more able to accurately record service provision/reception for families with recurrence (as they continued to be actively involved in their care). If this were true, the data could potentially be biased to underreport service rate for children with low recurrence, which could mask a true positive response to services. Alternatively, low recurrence may be more directly related to positive measures of family functioning (beyond those that were queried in this data set) that enabled families to respond to substantiation and prevent further maltreatment. The majority of caregiver variables in the NCANDS data file are indicators of risk rather than strength or resilience, and thus characteristics that promote resiliency were not well captured in this study.

The substantiated and moderate recurrence class had the fewest children, with approximately 10% of the sample. In consideration of the fact that families with substantiated reports were more likely to receive services, the moderate recurrence in this class may represent either an effect of surveillance, initial severity of family dysfunction, or both. Families receiving services such as case management, family preservation,

family support, and mental health services may have more contact with mandated reporters than families not receiving such services. Researchers have previously proposed an effect of surveillance bias, suggesting that families receiving services are re-reported to CPS more often than those not receiving services. However, some research has brought the extent of a surveillance bias effect into question. Drake, Jonson-Reid, and Kim (2017) recently found that children whose families received services had slightly more reports made uniquely by mental health and social service professionals (9.04%) than children whose families did not receive services (7.37%). Their calculations indicated that within the first three months of an initial report, surveillance bias contributed to up to 4.5 more reports for every 100 reports made for children receiving services. Similarly, Chaffin and Bard (2006) previously presented evidence that when subsequent reports made uniquely by service providers were excluded from analyses, the percentage of children with subsequent reports decreased by only 1.4% (27% to 26%).

In this sample, mental health providers were the source of 3.9% of 2011 reports and other social service professionals contributed to 7.7% of reports. It is not possible to determine from this data set whether these reports were uniquely made or duplicated by other reporters. The majority of reports in 2011 resulted from law enforcement personnel (19.1%) and educational professionals (16.4%). By the last time point assessed in this study, 4.5% of reports were made by mental health providers (children with services = 3.9%, children without services = 4.8%) and 8.2% were made by other social service professionals (with services = 10.0%, without services = 8.3%). In light of the report sources of this sample and prior findings suggesting a minimal effect, surveillance bias appears unlikely to have exerted a strong influence on the rate of re-reports for children

whose initial reports were substantiated. Severity of maltreatment allegation, risk of harm to child, and/or family risk factors may have contributed more significantly to the moderate rates of recurrence in this latent class. With regards to family risk factors, children in the substantiated and moderate recurrence class had the highest rate of poverty and caregiver substance abuse. These risk factors may pose particularly high risk for recurrent maltreatment, and future research should examine specific mechanisms through which this heightened risk is conferred.

### **Predictors of Substantiation Status Latent Classes**

Given the high rates of initially unsubstantiated reports (about 68%), the ability to predict which families proceed to experience maltreatment recurrence after an unsubstantiated report is very important. Characteristics that predicted notably higher likelihood of membership in the unsubstantiated and moderate recurrence class relative to the unsubstantiated and low recurrence class were prior victimization, caregiver substance abuse, caregiver emotional disturbance, poverty, and Black or African American race. Asian American children were much less likely to fall into classes marked by moderate recurrence than by low recurrence, regardless of whether the initial report was substantiated or unsubstantiated. These findings build upon previously reported indications that Asian American children have a lower lifetime prevalence of CPS investigations than children of other races (Kim et al., 2016). Future research is warranted to examine whether rates of maltreatment appear lower in this population due to lower rates of maltreatment, lower rates of reporting maltreatment, or a systemic bias related to accepting reports for investigation. This question would require analysis of data

that include information regarding all referrals, regardless of whether or not they were accepted for investigation.

Prior victimization can be readily determined internally through CPS records, but a record of caregiver emotional disturbance and substance abuse relies on detailed caseworker knowledge of these characteristics. The current findings demonstrate that these specific caregiver characteristics contribute to a relative estimate of recurrence risk, but the ability to use the results to direct service provision is limited by an ability to collect accurate, detailed information. Using unsubstantiated reports as opportunities for thorough assessment of families' needs and strengths allows many risk factors to be identified and used as flags for service prioritization. This model aligns well with the differential response model, in which families may receive services even in the absence of substantiated reports. As of 2015, differential response held legislative provisions in 30 states, with regulations and terminology varying across states (Williams-Mbengue, Ramirez-Fry, & Crane, 2015). Funding and organizational factors are major challenges to full adoption of this system and can preclude the assignment of necessary staff and financial resources to adequately support families with risk factors for recurrence. In addition, effective adoption of an approach like this would require a frame shift to include a specific focus on long-term risk in addition to more immediate safety. In the absence of differential response, children with initial unsubstantiated reports are in a uniquely risky situation due to minimal exposure to services. These families are unable to benefit from potentially helpful interventions unless they have been referred to such services through other avenues.

Few family characteristics meaningfully distinguished the substantiated and moderate recurrence class from the substantiated and low recurrence class, and those that did, including prior victimization and Asian American race, tended to parallel those that distinguished the unsubstantiated with moderate recurrence class from the unsubstantiated with low recurrence class. The lack of distinguishing factors may suggest that, within the group of children with substantiated reports, variations in recurrence patterns are accounted for by the nature of a families' engagement with services or markers of severity not captured by the studied variables.

Examining factors that differentiate between membership in an unsubstantiated versus a substantiated class membership across substantiation classes can provide information about the types of risk factors that indicate immediate harm or risk. In this sample, domestic violence was the variable that most strongly predicted membership in a substantiated class versus an unsubstantiated class, but conferred no heightened risk of recurrence within the substantiated class. Domestic violence also predicted increased likelihood of being in substantiated and low recurrence class relative to unsubstantiated and moderate recurrence class, strengthening the conclusion that this factor is more strongly associated with immediate substantiation status than risk of long-term recurrence. In its severe form, domestic violence can include violent weapons and police involvement. The presence and use of weapons often results in the risk of harm surpassing the threshold of substantiation. Another reason for this association with immediate substantiation may be that police officers often enter inside households during a response to domestic violence, where they may acquire additional concerns for child safety, such as risk of physical harm or exposure to substances. As mandated reporters,

they are required to report such concerns. The minimal effect of domestic violence on long-term recurrence may emerge because domestic violence can lead to incarceration of the perpetrator or the enactment of restraining orders, which could reduce the extent to which a child is exposed to continued domestic violence or maltreatment by the alleged perpetrator.

Additional factors, including caregiver substance abuse and poverty, increased the likelihood of being in a substantiated class relative to an unsubstantiated class. Further research is warranted to explore other variables, such as social support, impulsivity, and food security, that could be associated with substance abuse and poverty and may also impact severity of maltreatment. Prior research within a family preservation program has shown poverty to account for approximately 21% of the variance in case outcome, more so than individual factors such as mental health and substance abuse (Escaravage, 2014). It is also probable that substantiation is more common for particular types of maltreatment in families affected by substance abuse and poverty. In this sample, neglect was more often the primary type of alleged maltreatment for families affected by poverty (63.0%) than families not affected by poverty (50.5%), as well as for families with caregiver substance abuse (67.9%) than those without caregiver substance abuse (50.9%). Concerns of inadequate supervision, a form of neglect, may be particularly associated with substance abuse and poverty if caregivers under the influence of substances or working several jobs leave children alone or under the supervision of an unqualified person. Future risk research should consider the possibility of predictive models specific to various forms of child maltreatment. Identification of these variables would help clarify which factors to target with service provision to reduce subsequent risk.

## **Latent Classes of Service Provision**

The latent classes that emerged from the service provision variables were quite different from the proposed classes. The two classes that emerged distinguished between children who received no services from those who received some services, and provided some indication of the most commonly provided services. Within the class that received services, three main categories of services were present: family resource services (case management, family preservation, information and referrals), treatment services (counseling and substance abuse treatment), and legal/custodial services (foster care, juvenile petition, and court-appointed representative). Most likely, the failure to detect several classes of services was due to overall low rates of service provision, which was a surprising and concerning finding in this sample. The proportion of children who received services (approximately 12%) was smaller than the proportion of children whose reports were substantiated. It remains to be seen whether the low rate of service provision is a casualty of imprecise coding by which uncertain responses are coded “no,” or whether services are truly not offered to many families with substantiated reports. Precise answers to these questions likely requires detailed review of state-level data to enable comparison to this national data set. Although attempts were made to conduct a qualitative comparison of Vermont codes submitted to NCANDS with data from individual files, high workloads and varied demands on case workers’ time precluded this analysis at the current time.

In this sample, families affected by poverty were less likely to receive services than those not affected by poverty. Given that poverty rates were higher for substantiated reports than unsubstantiated reports, it does not appear that this unexpected finding is

related to substantiation status. The precision of the service provision variables may influence these findings; as outlined in the NCANDS codebook, service provision denotes that services were “provided or arranged” for a family and does not specify whether endorsement of this variable requires that the family actually engage in services. If so, the lower rate of services in poor families may be partly explained by poverty-driven barriers to service engagement, including transportation and caregivers’ ability to take time away from work to attend appointments.

### **Service Provision Mediation Models**

Service provision latent classes partially mediated the association between substantiation status of initial report and all three forms of recurrence, including total reports, total substantiated reports, and years in foster care. Interestingly, when accounting for service class, the only model for which the direct effect of substantiated initial report predicted lower recurrence was for total subsequent reports. An initial substantiated report predicted more subsequent substantiated reports, which indicates that the minimizing effect on total subsequent reports was driven by a reduction in unsubstantiated reports. The association between substantiation and fewer subsequent unsubstantiated reports could be explained by an underlying severity and/or family risk profile that accurately characterized the initial substantiation and contributes to continued maltreatment that at a level that warrants substantiation. Some, likely small, degree of surveillance bias may also reduce unsubstantiated reports, as mandated reporters who provide services are more aware of the information required for a detailed report to CPS, and may provide reports that are more easily substantiated. It would be helpful to compare rates of substantiated and unsubstantiated referrals made by mandated reporters

to clarify whether awareness of the information that is necessary to collect leads to reduced unsubstantiated reports, or whether the duty to report results in more unsubstantiated reports as reporters err on the side of caution. It is also important to consider the small effect sizes of many of these mediation results; although statistically significant, some coefficients, particularly those of indirect effects, were very close to zero.

As expected, an initial substantiated report predicted higher likelihood of service reception. Contrary to the hopes of service provision, families that received services had higher rates of subsequent reports, substantiated reports, and foster care than families that did not receive services. Given the previously discussed findings that surveillance bias appears to contribute to only small increases in re-reports, this finding is most likely due to higher baseline severity of maltreatment and higher rates of associated family and caregiver risk factors that are present in the families with substantiated reports and service reception. Such risk factors may take a long time to alter or may not be directly or indirectly influenced by the services provided.

Although it is somewhat disheartening to witness the provision of services associated with higher recurrence, it is important to consider that a positive association does not necessarily mean a failure to reduce recurrence. It could be that families deemed at highest risk of recurrence receive services that do in fact decrease recurrence, just to an extent that does not bring recurrence to zero. Without a randomized controlled study in which families of similar risk and substantiation status were assigned to either receive or not receive services, it is not possible to know how often recurrence would occur in the absence of services. It is also important to contemplate the way in which distinct types of

services may differentially affect outcomes. The services types included in the NCANDS sample range greatly, with some aimed at treatment (counseling, substance abuse services) and others necessary services to support guardianship changes (court-appointed representative in foster care proceedings). The post-hoc analysis of the subsample of children with substantiated reports demonstrated many more latent classes than the dichotomous classes that emerged from the overall sample. Among this subsample, general recurrence (total reports) was highest in the class of children who received no services. The class that received resources, treatment, and family preservation services had the lowest number of overall subsequent reports (including substantiated and unsubstantiated), whereas the foster care class had the fewest number of substantiated reports. These post-hoc analyses provide some initial support for the differential effect of unique services on subsequent recurrence while also entertaining the contribution of an underlying severity marker.

Future analyses would benefit from including a severity marker, such as calculated risk score obtained from the empirically-based Structured Decision Making® assessments being widely used (Johnson & O'Connor, 2008). More detailed analysis of services targeting identified risk factors (particularly substance abuse, financial needs, and mental health) may be possible using data sets with heightened levels of specificity. Distinguishing whether services were recommended versus mandated and whether or not families regularly engaged with services would help inform an accurate understanding of which services reduce recurrence, and in which families. State level data are likely better able to capture these nuances, as policies for referrals and mandated engagement vary by state.

## **Limitations**

Despite the many advantages of a large data set, it is important to also consider the limitations of this study. Missing data were common and resulted in much smaller subsamples that differed somewhat from the overall file in regards to racial distribution and living situations. Relative to the overall file, the substantiation status latent class analysis sample had a higher percentage of children identifying as White and fewer children identifying as American Indian, Alaska Native, or Asian American. This difference is likely due to exclusion of many states and/or jurisdictions where a large proportion of minority race children live. Based on recent estimates, Hawaii, California, Nevada, Texas, New Mexico, Washington DC, and Puerto Rico have more residents of minority race or ethnicity than majority (Nittle, 2018). Of these jurisdictions, all but New Mexico and Texas had to be excluded for the substantiation status analyses due to missing data. For the service provision analyses, Texas and Nevada were the only states retained. Although the remaining states provided a large sample of minority race/ethnicity children, it is possible that the racial composition of states excluded contributed bias to these results. Relative to the overall sample, the subsamples for both the substantiation status and service provision latent analyses included more children living with one caregiver and fewer children living with both parents. Aside from these characteristics, demographics were largely similar between subsamples and the overall sample.

These findings and conclusions would be strengthened were caseworkers able to access public health data bases to aid in accurate coding. For example, endorsement of

caregiver emotional disturbance requires the disorder to be clinically diagnosed according to the most recent version of the Diagnostic and Statistical Manual of Mental Disorders. As disclosure of mental health diagnoses is largely dependent upon the caregiver, who may have reasons for choosing to withhold such information, it is reasonable to wonder whether this caregiver characteristic is underreported in this sample. The predictive power of this and other family characteristics might be different if more objective means were available to assess the given variables.

Although this data set did not contain a proxy for harm risk, such a variable would help account for the “severity” factor that may, here, be confounded with substantiation status and service provision. This somewhat limited the extent to which conclusions could be made regarding the effect of service provision, and in the future would be helpful to include as a predictor variable. These data were collected from 2011 to 2015, and thus the “first report” referenced was the first report in 2011 and not necessarily the first report of a child’s lifetime. NCANDS assesses prior substantiated maltreatment but does not collect information about prior unsubstantiated reports. Variables denoting the number of prior reports (unsubstantiated as well as substantiated) would allow researchers to examine patterns of recurrence exclusively occurring after the very first report of a child’s lifetime, which would further support efforts in longitudinal predictive analytics and tertiary prevention.

Additionally, although a strength of this data set is its inclusion of unsubstantiated reports made in the studied years, it only includes reports accepted for investigation. Thus, this sample cannot provide information about previous unaccepted referrals to CPS. It is worth examining whether factors related to unaccepted referrals, such as

number of referrals or time between referrals, serves as a useful predictor of subsequent maltreatment. Certainly, assessment of the needs of all families referred to CPS, regardless of whether reports were accepted for investigation, would require substantial funds and resources. In addition, broadband assessment of that nature may often be superfluous efforts when provided to families whose children were never at true risk of maltreatment. However, for research purposes, inclusion of non-investigated referrals would provide important evidence for assessing patterns of risk factors, and in particular, for identifying risk factors that predict increasing patterns of report frequency or severity. Due to the challenges of collecting complete and accurate data on a national scale, the study of longitudinal patterns beginning at first referral will likely benefit immensely from the inclusion of state-specific, rich data sets, particularly those linked with public health or public service records that would provide up-to-date information regarding mental health diagnoses and financial status. When viewed through a lens of prioritizing effective services for those most at-risk, the study of recurrence allows for early intervention and promotion of stable caregiving.

### **Conclusions and Future Directions**

It is possible to identify child, caregiver, and case characteristics at the beginning of a time period that predict the substantiation status of that report and/or risk of maltreatment recurrence over the following five years. Although CPS agencies have made great strides in predictive risk modeling in recent years, a large emphasis remains on shorter term risk prediction. Indeed, the variables collected for this national database were, by and large, more predictive of immediate risk and/or severity and were less helpful in distinguishing longer term trajectories of recurrence. This makes intuitive

sense, as CPS workers must prioritize immediate safety over five-year predictions, but as technology opens the door to the integration of electronic public health and human services systems, it may become more feasible to assess both short- and long-term risk by capturing more variables. Of course, the ethical considerations of an integrated database use for predictive modeling are numerous. Vaithianathan and colleagues' (2018) recent work suggests that an additional rationale for integrating such rich data sets may lie in the ability of these models, that focus on risk of child maltreatment, to also predict negative outcomes in additional domains. These researchers found that the children in the highest risk decile based on an algorithm predicting child maltreatment were 10 times more likely to die by unintentional injury, and over eight times more likely to die by post-neonatal sudden unexplained infant death than other children. The authors posit that if all families could be screened for risk using up-to-date databases that capture relevant variables, education about a wide variety of possible negative health outcomes may help encourage families to engage with voluntary services when offered. Certainly, major changes to CPS funding allocation would be required to expand service provision accordingly, though, if services are effective, some of the additional funding needed to provide preventive services to high risk families could likely be deducted from the current budget for investigation of new allegations and stipends to foster care parents.

Further, as differential response programs continue to be nationally and consistently implemented, predictive modeling can help identify families most in need of the types of services offered through differential response. As noted by Macchione, Wooten, Yphantides, and Howell (2013), the challenges of CPS departments nationwide align with the "Triple Aim" at the forefront of current healthcare, which strives to

improve service to individual clients/patients, improve population health, and reduce per capita costs. A system that meets all three aims holds great promise for developing proactive and lasting change within the child welfare system, as well. Organizational changes to such systems relies equally on a foundation of diverse, methodologically sound research as well as individuals willing to advocate for its implications.

Table 1  
*Frequency of Reports from 2012-2015, Stratified by Report Status/Number in 2011*

| Report(s) in 2011        | Report(s)<br>in 2012<br>(% yes) |      | Report(s)<br>in 2013<br>(% yes) |     | Report(s)<br>in 2014<br>(% yes) |     | Report(s)<br>in 2015<br>(% yes) |     |
|--------------------------|---------------------------------|------|---------------------------------|-----|---------------------------------|-----|---------------------------------|-----|
|                          | U                               | S    | U                               | S   | U                               | S   | U                               | S   |
| Overall sample           | 12.4                            | 5.8  | 9.1                             | 4.4 | 7.9                             | 3.7 | 7.2                             | 3.2 |
| Only U                   | 12.8                            | 5.2  | 8.8                             | 3.8 | 7.4                             | 3.2 | 6.6                             | 2.8 |
| Only S                   | 10.3                            | 6.3  | 8.7                             | 5.1 | 8.0                             | 4.3 | 7.8                             | 3.9 |
| Both (U+S)               | 21.5                            | 11.7 | 16.4                            | 8.5 | 14.1                            | 6.8 | 13.4                            | 6.5 |
| 2 + reports <sup>a</sup> | 22.5                            | 10.7 | 16.4                            | 7.5 | 13.9                            | 6.3 | 12.5                            | 5.6 |

*Note.* U = unsubstantiated. S = substantiated. Overall n = 246,021. Only U n = 162,195. Only S n = 63,994. Both n = 9,778. 2+ reports n = 28,427.

<sup>a</sup>Of children with 2 + reports, only U = 52.6%, Only S = 12.2%, Both = 34.4%.

Table 2  
Correlations among Predictor Variables

|              | AI/AN<br>race | AS<br>race | BL/AA<br>race | NH/PI<br>race | WH<br>race | Child<br>Age | Child<br>Sex | DV    | Caregiver<br>ED | Caregiver<br>SA | Poverty |
|--------------|---------------|------------|---------------|---------------|------------|--------------|--------------|-------|-----------------|-----------------|---------|
| AS race      | .01           |            |               |               |            |              |              |       |                 |                 |         |
| BL/AA race   | -.06**        | -.04**     |               |               |            |              |              |       |                 |                 |         |
| NH/PI race   | .00           | .02**      | -.02**        |               |            |              |              |       |                 |                 |         |
| WH race      | -.13**        | -.09**     | -.78**        | -.04**        |            |              |              |       |                 |                 |         |
| Child age    | -.01*         | .01**      | -.02**        | .00           | .02**      |              |              |       |                 |                 |         |
| Child sex    | .00           | .00        | .00           | .00           | .00        | -.01**       |              |       |                 |                 |         |
| DV           | .04**         | .00        | -.05**        | .01           | .05**      | -.05**       | .00          |       |                 |                 |         |
| Caregiver ED | .04**         | .00        | -.02**        | .00           | .03**      | -.02**       | .00          | .10** |                 |                 |         |
| Caregiver SA | .08**         | -.02**     | -.07**        | -.01*         | .07**      | -.05**       | .00          | .17** | .17**           |                 |         |
| Poverty      | .07**         | -.02**     | -.02**        | .00           | .04**      | -.04**       | .00          | .15** | .17**           | .30**           |         |
| Prior victim | .02**         | -.02**     | -.02**        | .00           | .06**      | .16**        | .00          | .04** | .05**           | .13**           | .11**   |

Note. Pearson correlation used, phi for two dichotomous variables, point-biserial for dichotomous with continuous (age) variables. All variables except for age are coded 1 = yes, 0 = no. DV = domestic violence. ED = emotional disturbance. SA = substance abuse.

\*  $p < .01$  \*\*  $p < .001$

Table 3  
Model Fit Statistics for Substantiation Status Latent Class Models

| Number of classes | AIC        | BIC        | SS-adjusted BIC | Entropy | VLMR LRT (k v k-1) | LMR adj. LRT (k v k-1) | N   |
|-------------------|------------|------------|-----------------|---------|--------------------|------------------------|---|
| 1                 | 1479413.75 | 1479517.88 | 1479486.10      | --      | $p < .0001$        | $p < .0001$            | C1 = 246,021  |
| 2                 | 1184557.03 | 1184775.71 | 1184708.97      | .96     | $p < .0001$        | $p < .0001$            | C1 = 30.0%<br>C2 = 70.0%  |
| 3                 | 1165762.32 | 1166095.54 | 1165993.85      | .74     | $p < .0001$        | $p < .0001$            | C1 = 30.7%<br>C2 = 54.1%<br>C3 = 15.2%                            |
| 4                 | 1160810.28 | 1161258.05 | 1161121.39      | .68     | $p < .0001$        | $p < .0001$            | C1 = 15.8%<br>C2 = 19.8%<br>C3 = 10.2%<br>C4 = 54.2%              |
| 5                 | 1156461.79 | 1157024.10 | 1156852.48      | .72     | $p < .0001$        | $p < .0001$            | C1 = 10.2%<br>C2 = 3.6%<br>C3 = 14.1%<br>C4 = 52.3%<br>C5 = 19.8% |

Note. SS = sample size. VLMR LRT = Vuong-Lo-Mendell-Rubin Likelihood Ratio Test. LMR = Lo-Mendell-Rubin. k v k-1 compares fit of model with k classes to model with k-1 classes.

Table 4  
*Percentage of Child, Caregiver, and Case Variables Endorsed in 2011, by Latent Class*

| Latent Class | Prior victim | Male sex | Poverty | SA   | DV   | ED  |
|--------------|--------------|----------|---------|------|------|-----|
| U + moderate | 27.9         | 50.6     | 22.7    | 13.5 | 10.4 | 3.9 |
| S + low      | 19.7         | 50.4     | 27.7    | 21.1 | 20.7 | 4.8 |
| S + moderate | 31.0         | 50.6     | 32.9    | 24.3 | 22.9 | 6.0 |
| U + low      | 12.6         | 51.5     | 15.3    | 8.0  | 8.4  | 2.1 |

*Note.* Percentages represent proportion of sample that scored 'yes' on given variables. U = unsubstantiated. S = substantiated. SA = caregiver substance abuse. DV = domestic violence. ED = caregiver emotional disturbance.

Table 5  
*Racial Identities of Sample, by Latent Class*

| Class        | American Indian or Alaska Native (%) | Asian American (%) | Black or African American (%) | Native Hawaiian or Pacific Islander (%) | White (%) |
|--------------|--------------------------------------|--------------------|-------------------------------|---|-----------|
| U + moderate | 1.9                                  | 0.5                | 23.6                          | 0.2                                     | 74.7      |
| S + low      | 2.1                                  | 0.9                | 26.7                          | 0.3                                     | 70.2      |
| S + moderate | 2.0                                  | 0.4                | 26.2                          | 0.2                                     | 72.9      |
| U + low      | 1.3                                  | 1.0                | 25.1                          | 0.2                                     | 69.8      |

*Note.* Percentages represent proportion of sample that scored 'yes' on given variables. U = unsubstantiated. S = substantiated.

Table 6

*Type of Primary Alleged Maltreatment in Initial 2011 Report, by Latent Class*

| Latent Class | Physical<br>(%) | Neglect<br>(%) | Medical        |               | Emotional<br>(%) | None<br>(%) | Other<br>(%) |
|--------------|-----------------|----------------|----------------|---------------|------------------|-------------|--------------|
|              |                 |                | Neglect<br>(%) | Sexual<br>(%) |                  |             |              |
| U + moderate | 27.6            | 54.4           | 2.1            | 6.4           | 3.2              | 5.6         | 0.7          |
| S + low      | 18.2            | 56.3           | 1.4            | 8.8           | 5.5              | 9.0         | 0.9          |
| S + moderate | 18.2            | 60.4           | 1.6            | 6.7           | 5.1              | 7.1         | 1.0          |
| U + low      | 28.0            | 50.6           | 2.1            | 8.5           | 2.5              | 8.0         | 0.4          |

*Note.* U = unsubstantiated. S = substantiated.

Table 7a  
 Logistic Regression Coefficients and Relative Risk Ratios of Latent Class Membership, U + Low as Reference Group

|                | U + moderate  |                                  | S + moderate  |                                  | S + low       |                                  |
|----------------|---------------|----------------------------------|---------------|----------------------------------|---------------|----------------------------------|
|                | B (SE)        | Exp(B)<br>Relative<br>risk ratio | B (SE)        | Exp(B)<br>Relative<br>risk ratio | B (SE)        | Exp(B)<br>Relative<br>risk ratio |
| Child age      | -0.03 (.00)** | 0.97                             | -0.07 (.00)** | 0.93                             | -0.04 (.00)** | 0.96                             |
| Child male sex | -0.03 (.01)*  | 0.96                             | -0.06 (.02)** | 0.95                             | -0.05 (.01)** | 0.95                             |
| Prior victim   | 0.96 (.02)**  | 2.60                             | 1.03 (.02)**  | 2.80                             | 0.41 (.02)**  | 1.50                             |
| ED             | 0.30 (.04)**  | 1.35                             | 0.42 (.04)**  | 1.52                             | 0.29 (.04)**  | 1.33                             |
| DV             | 0.10 (.02)**  | 1.10                             | 0.97 (.02)**  | 2.64                             | 0.94 (.02)**  | 2.56                             |
| SA             | 0.31 (.02)**  | 1.36                             | 0.81 (.02)**  | 2.24                             | 0.80 (.02)**  | 2.23                             |
| Poverty        | 0.30 (.02)**  | 1.35                             | 0.58 (.02)**  | 1.79                             | 0.41 (.02)**  | 1.50                             |
| AI/AN race     | 0.10 (.05)    | 1.10                             | 0.03 (.06)    | 1.03                             | 0.24 (.05)**  | 1.27                             |
| Bl/AA race     | -0.02 (.02)   | 0.98                             | 0.04 (.02)    | 1.04                             | -0.04 (.02)   | 0.96                             |
| AsAm race      | -0.68 (.09)** | 0.50                             | -0.70 (.12)** | 0.50                             | 0.03 (.06)    | 1.03                             |
| NH/PI race     | -0.20 (.15)   | 0.82                             | 0.31 (.15)    | 1.36                             | 0.52 (.11)**  | 1.67                             |

Note. SE = Standard Error. Exp(B) = Exponentiated coefficient. ED = caregiver emotional disturbance. DV = domestic violence. SA = caregiver substance abuse. AI/AN = American Indian or Alaska Native. Bl/AA = Black or African American. AsAm = Asian American. NH/PI = Native Hawaiian or Pacific Islander. \*  $p < .01$  \*\*  $p < .001$

Table 7b  
*Logistic Regression Coefficients and Relative Risk Ratios of Latent Class Membership, S + Moderate as Reference Group*

|                | U + moderate  |                                  | S + low       |                                  |
|----------------|---------------|----------------------------------|---------------|----------------------------------|
|                | B (SE)        | Exp(B)<br>Relative risk<br>ratio | B (SE)        | Exp(B)<br>Relative risk<br>ratio |
| Child age      | 0.04 (.00)**  | 1.04                             | 0.03 (.00)**  | 1.03                             |
| Child male sex | 0.02 (.02)    | 1.02                             | 0.01 (.02)    | 1.01                             |
| Prior victim   | -0.07 (.02)*  | 0.93                             | -0.62 (.02)** | 0.54                             |
| ED             | -0.11 (.05)   | 0.89                             | -0.13 (.04)*  | 0.88                             |
| DV             | -0.87 (.03)** | 0.42                             | -0.03 (.02)   | 0.97                             |
| SA             | -0.50 (.03)** | 0.61                             | -0.01 (.02)   | 1.00                             |
| Poverty        | -0.28 (.02)** | 0.75                             | -0.18 (.02)** | 0.84                             |
| AI/AN race     | -0.07 (.07)   | 1.07                             | 0.21 (.06)**  | 1.24                             |
| Bl/AA race     | -0.06 (.02)*  | 0.94                             | -0.07 (.02)** | 0.93                             |
| AsAm race      | 0.02 (.14)    | 1.02                             | 0.74 (.12)**  | 2.09                             |
| NH/PI race     | -0.51 (.19)*  | 0.60                             | 0.21 (.16)    | 1.23                             |

*Note.* SE = Standard Error. Exp(B) = Exponentiated coefficient. ED = caregiver emotional disturbance. DV = domestic violence. SA = caregiver substance abuse. AI/AN = American Indian or Alaska Native. Bl/AA = Black or African American. AsAm = Asian American. NH/PI = Native Hawaiian or Pacific Islander. \*  $p < .01$  \*\*  $p < .001$

Table 7c  
*Logistic Regression Coefficients and Relative Risk Ratios of Latent Class Membership,  
 S + Low as Reference Group*

|                | U + moderate  |                               |
|----------------|---------------|-------------------------------|
|                | B (SE)        | Exp(B)<br>Relative risk ratio |
| Child age      | 0.01 (.00)*   | 1.01                          |
| Child male sex | 0.02 (.02)    | 1.02                          |
| Prior victim   | 0.55 (.02)**  | 1.73                          |
| ED             | 0.02 (.04)    | 1.02                          |
| DV             | -0.84 (.02)** | 0.43                          |
| SA             | -0.50 (.02)** | 0.61                          |
| Poverty        | -0.11 (.02)** | 0.90                          |
| AI/AN race     | -0.15 (.06)   | 0.86                          |
| BI/AA race     | 0.01 (.02)    | 1.01                          |
| AsAm race      | -0.72 (.10)** | 0.49                          |
| NH/PI race     | -0.72 (.16)** | 0.49                          |

*Note.* SE = Standard Error. Exp(B) = Exponentiated coefficient. ED = caregiver emotional disturbance. DV = domestic violence. SA = caregiver substance abuse. AI/AN = American Indian or Alaska Native. BI/AA = Black or African American. AsAm = Asian American. NH/PI = Native Hawaiian or Pacific Islander.

\*  $p < .01$  \*\*  $p < .001$

Table 8  
*Frequency of Service Provision Within Overall Sample, Substantiated Sample, and Served Sample*

| Service                             | Overall Sample (%) | Substantiated Sample (%) | Served Sample (%) |
|-------------------------------------|--------------------|--------------------------|-------------------|
| Adoption                            | 1.1                | 2.1                      | 5.2               |
| Case management                     | 13.5               | 35.4                     | 51.9              |
| Court-appointed rep.                | 4.2                | 11.2                     | 18.5              |
| Counseling                          | 5.1                | 13.9                     | 26.9              |
| Day care                            | 2.5                | 5.4                      | 8.2               |
| Educational and training            | 1.0                | 2.8                      | 5.0               |
| Employment                          | 0.2                | 0.6                      | 1.2               |
| Family planning                     | 0.2                | 0.6                      | 1.2               |
| Family preservation                 | 6.7                | 17.2                     | 31.5              |
| Family support                      | 2.8                | 5.1                      | 11.9              |
| Foster care                         | 7.1                | 22.3                     | 37.6              |
| Health-related and home health      | 2.1                | 3.5                      | 8.3               |
| Home-based                          | 2.2                | 6.6                      | 12.6              |
| Housing                             | 1.2                | 2.2                      | 6.1               |
| Information and referral            | 6.4                | 9.2                      | 13.3              |
| Juvenile court petition             | 4.9                | 16.6                     | 26.9              |
| Legal                               | 0.8                | 3.1                      | 4.7               |
| Mental health                       | 2.5                | 7.1                      | 14.4              |
| Other                               | 3.6                | 7.4                      | 10.4              |
| Pregnancy and parenting             | 1.5                | 4.7                      | 7.9               |
| Respite                             | 0.8                | 2.1                      | 5.0               |
| SS juvenile delinquent              | 0.0                | 0.1                      | 0.2               |
| SS disability                       | 0.7                | 2.4                      | 4.5               |
| Substance abuse                     | 3.3                | 10.3                     | 18.8              |
| Independent and transitional living | 0.0                | 0.1                      | 0.2               |
| Transportation                      | 1.2                | 3.4                      | 6.9               |

*Note.* SS = Special Services.

Table 9  
*Model Fit Statistics for Service Provision Latent Class Models*

| Number of classes | AIC        | BIC        | SS-adjusted BIC | Entropy | VLMR LRT (k v k-1) | LMR adj LRT (k v k-1) | N  |
|-------------------|------------|------------|-----------------|---------|--------------------|-----------------------|--|
| 1                 | 2510954.39 | 2511243.70 | 2511161.07      | --      | --                 | --                    | C1 = 502,355 (100.0%)  |
| 2                 | 1894088.37 | 1894678.10 | 1894509.67      | .91     | $p < .0001$        | $p < .0001$           | C1 = 63,450 (12.6%)<br>C2 = 438,905 (87.4%)                      |
| 3                 | 1824972.42 | 1825862.58 | 1825608.34      | .92     | $p = .33$          | $p = .33$             | C1 = 45,162 (9.0%)<br>C2 = 427,508 (85.1%)<br>C3 = 29,685 (5.9%) |

*Note.* VLMR LRT = Vuong-Lo-Mendell-Rubin. LMR = Lo-Mendell-Rubin. k v k-1 compares fit of model with k classes to fit of model with k-1 classes.

Table 10a

*Logistic/Linear Regression Coefficients for Subsequent Reports Mediation Model*

| Dependent variable        | Predictor                  | B <sup>a</sup> | SE    | Lower 2.5% CI | Upper 2.5% CI | Exp(B) Relative Risk Ratio | <i>p</i> |
|---------------------------|----------------------------|----------------|-------|---------------|---------------|----------------------------|----------|
| Latent Class <sup>b</sup> | Substantiated first report | 1.76           | .01   | 1.74          | 1.78          | 5.81                       | < .001   |
|                           | Child age                  | 0.04           | .00   | 0.03          | 0.04          | 1.04                       | < .001   |
|                           | Male sex                   | 0.01           | .01   | -0.01         | 0.03          | 1.01                       | .22      |
|                           | Poverty                    | -0.89          | .01   | -0.91         | -0.86         | 0.41                       | < .001   |
|                           | AI/AN race                 | 1.61           | .04   | 1.54          | 1.69          | 5.02                       | < .001   |
|                           | AsAm race                  | -0.15          | .06   | -0.27         | -0.04         | 0.86                       | < .01    |
|                           | Bl/AfAm race               | -0.36          | .01   | -0.39         | -0.34         | 0.70                       | < .001   |
|                           | NH/PI race                 | 0.65           | .09   | 0.47          | 0.82          | 1.91                       | < .001   |
| # Subsequent reports      | Latent class               | -0.24          | .01   | -0.26         | -0.23         | --                         | < .001   |
|                           | Substantiated first report | 0.09           | .01   | 0.08          | 0.10          | --                         | < .001   |
|                           | Child age                  | -0.01          | .00   | -0.01         | -0.01         | --                         | < .001   |
|                           | Male sex                   | 0.01           | .01   | -0.00         | 0.02          | --                         | .10      |
|                           | Poverty                    | -0.54          | .01   | -0.55         | -0.53         | --                         | < .001   |
|                           | AI/AN race                 | -0.12          | .03   | -0.17         | -0.06         | --                         | < .001   |
|                           | AsAm race                  | 0.46           | .02   | 0.41          | 0.49          | --                         | < .001   |
|                           | Bl/AfAm race               | -0.01          | .01   | -0.03         | 0.00          | --                         | .03      |
| NH/PI race                | 0.08                       | .06            | -0.05 | 0.20          | --            | .18                        |          |

*Note.* SE = standard error. CI = confidence interval. Exp(B) = exponentiated coefficient (relative risk ratio). AI/AN = American Indian or Alaska Native; Bl/AA = Black or African American; AsAm = Asian American; NH/PI = Native Hawaiian or Pacific Islander. Reference group = White. All predictor variables except for age (continuous) are coded 1=yes, 2=no. <sup>a</sup>B = logistic regression coefficient for latent class as dependent variable, B = unstandardized linear regression coefficient for # subsequent reports as dependent variable. <sup>b</sup>Latent class coding: 1 = services class, 2 = no services class.

Table 10b

*Indirect, Direct, and Total Effects for Subsequent Reports Mediation Model*

| Effect       | B     | SE  | Lower 2.5%<br>CI | Upper 2.5%<br>CI | <i>p</i> |
|--------------|-------|-----|------------------|------------------|----------|
| Indirect     | -0.04 | .01 | -0.05            | -0.03            | < .001   |
| Direct       | 0.09  | .01 | 0.08             | 0.10             | < .001   |
| Total effect | 0.05  | .01 | 0.03             | 0.07             | < .001   |

*Note.* B = unstandardized regression coefficient. SE = standard error. CI = confidence interval.

Table 11a

*Linear Regression Coefficients for Subsequent Substantiated Reports Mediation Model*

| Dependent variable   | Predictor                  | B     | SE  | Lower 2.5% CI | Upper 2.5% CI | <i>p</i> |
|----------------------|----------------------------|-------|-----|---------------|---------------|----------|
| # Subsequent reports | Latent class <sup>a</sup>  | -0.05 | .00 | -0.06         | -0.04         | < .001   |
|                      | Substantiated first report | -0.07 | .00 | -0.07         | -0.06         | < .001   |
|                      | Child age                  | -0.01 | .00 | -0.01         | -0.01         | < .001   |
|                      | Male sex                   | 0.01  | .00 | 0.00          | 0.01          | < .001   |
|                      | Poverty                    | -0.09 | .00 | -0.09         | -0.08         | < .001   |
|                      | AI/AN race                 | -0.07 | .01 | -0.09         | -0.05         | < .001   |
|                      | AsAm race                  | 0.11  | .01 | 0.10          | 0.12          | < .001   |
|                      | Bl/AfAm race               | 0.00  | .00 | -0.00         | 0.01          | .09      |
|                      | NH/PI race                 | -0.01 | .02 | -0.06         | 0.03          | .71      |

*Note.* B = unstandardized linear regression coefficient. SE = standard error. CI = confidence interval. Exp(B) = exponentiated coefficient (relative risk ratio). AI/AN = American Indian or Alaska Native; Bl/AA = Black or African American; AsAm = Asian American; NH/PI = Native Hawaiian or Pacific Islander. Reference group = White. <sup>a</sup>Latent class coding: 1 = service class, 2 = no service class. All other variables, except for age (continuous) are coded 1 = yes, 2 = no.

Table 11b

*Indirect, Direct, and Total Effects for Subsequent Substantiated Reports Mediation Model*

| Effect       | B     | SE  | Lower 2.5%<br>CI | Upper 2.5%<br>CI | <i>p</i> |
|--------------|-------|-----|------------------|------------------|----------|
| Indirect     | -0.01 | .00 | 0.01             | 0.01             | < .001   |
| Direct       | -0.07 | .00 | 0.06             | 0.07             | < .001   |
| Total effect | -0.08 | .00 | 0.07             | 0.08             | < .001   |

*Note.* B = unstandardized regression coefficient. SE = standard error. CI = confidence interval.

Table 12a

*Linear Regression Coefficients for Foster Care Mediation Model*

| Dependent variable   | Predictor                  | B     | SE  | Lower 2.5% CI | Upper 2.5% CI | <i>p</i> |
|----------------------|----------------------------|-------|-----|---------------|---------------|----------|
| # Subsequent reports | Latent class <sup>a</sup>  | -0.07 | .00 | -0.07         | -0.06         | < .001   |
|                      | Substantiated first report | -0.01 | .00 | -0.01         | -0.01         | < .001   |
|                      | Child age                  | -0.00 | .00 | 0.00          | 0.00          | < .001   |
|                      | Male sex                   | 0.00  | .00 | 0.00          | 0.00          | .02      |
|                      | Poverty                    | -0.02 | .00 | -0.02         | -0.02         | < .001   |
|                      | AI/AN race                 | -0.04 | .01 | -0.05         | -0.03         | < .001   |
|                      | AsAm race                  | 0.02  | .00 | 0.02          | 0.03          | < .001   |
|                      | Bl/AfAm race               | -0.01 | .00 | -0.01         | -0.01         | < .001   |
|                      | NH/PI race                 | 0.03  | .01 | -0.02         | 0.02          | .73      |

*Note.* B = unstandardized linear regression coefficient. SE = standard error. CI = confidence interval. Exp(B) = exponentiated coefficient (relative risk ratio). AI/AN = American Indian or Alaska Native; Bl/AA = Black or African American; AsAm = Asian American; NH/PI = Native Hawaiian or Pacific Islander. Reference group = White. <sup>a</sup>Latent class coding: 1 = service class, 2 = no service class. All other variables, except for age (continuous) are coded 1 = yes, 2 = no.

Table 12b  
*Indirect, Direct, and Total Effects for Foster Care Mediation Model*

| Effect       | B     | SE  | Lower 2.5%<br>CI | Upper 2.5%<br>CI | <i>p</i> |
|--------------|-------|-----|------------------|------------------|----------|
| Indirect     | -0.01 | .00 | -0.02            | -0.01            | < .001   |
| Direct       | -0.01 | .00 | -0.01            | -0.01            | < .001   |
| Total effect | -0.02 | .00 | -0.02            | -0.02            | < .001   |

*Note.* B = unstandardized regression coefficient. SE = standard error. CI = confidence interval.

Table 13

*Model Fit Statistics for Service Provision Latent Class Models, Subsample of Substantiated Cases*

| Number of classes | AIC        | BIC        | SS-adjusted BIC | Entropy | VLMR LRT (k v k-1) | LMR adj LRT (k v k-1) | N  |
|-------------------|------------|------------|-----------------|---------|--------------------|-----------------------|--|
| 1                 | 1108923.69 | 1109175.15 | 1109092.52      | --      | --                 | --                    | C1 = 117,179 (100%)  |
| 2                 | 890609.99  | 891122.58  | 890954.14       | .89     | $p < .0001$        | $p < .0001$           | C1 = 29,565 (25.2%)<br>C2 = 87,614 (74.8%)   |
| 3                 | 835395.92  | 836169.64  | 835915.40       | .90     | $p < .0001$        | $p < .0001$           | C1 = 12,384 (10.6%)<br>C2 = 88,407 (75.4%)<br>C3 = 16,388 (14.0%)  |
| 4                 | 807698.41  | 808733.26  | 808393.21       | .87     | $p < .0001$        | $p < .0001$           | C1 = 13,330 (11.4%)<br>C2 = 80,520 (68.7%)<br>C3 = 5,373 (4.6%)<br>C4 = 17,956 (15.3%)   |
| 5                 | 792220.00  | 793515.98  | 793090.12       | .85     | $p < .0001$        | $p < .0001$           | C1 = 5,427 (4.6%)<br>C2 = 6,095 (5.2%)<br>C3 = 14,819 (14.6%)<br>C4 = 78,668 (67.1%)<br>C5 = 12,170 (10.4%)                    |
| 6                 | 782534.14  | 784091.24  | 783579.58       | .86     | $p < .0001$        | $p < .0001$           | C1 = 5,469 (4.7%)<br>C2 = 6,261 (5.3%)<br>C3 = 4,485 (3.8%)<br>C4 = 10,391 (8.9%)<br>C5 = 10,875 (9.3%)<br>C6 = 79,698 (68.0%) |

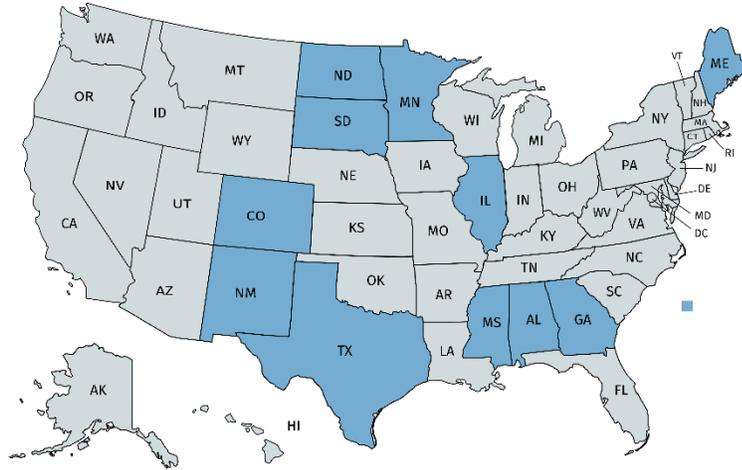
*Note.* VLMR LRT = Vuong-Lo-Mendell-Rubin. LMR = Lo-Mendell-Rubin.  $k$  v  $k-1$  compares fit of model with  $k$  classes to fit of model with  $k-1$  classes.

Table 14

*Means and Standard Deviations of Number of Reports from 2012 to 2015, by Latent Class*

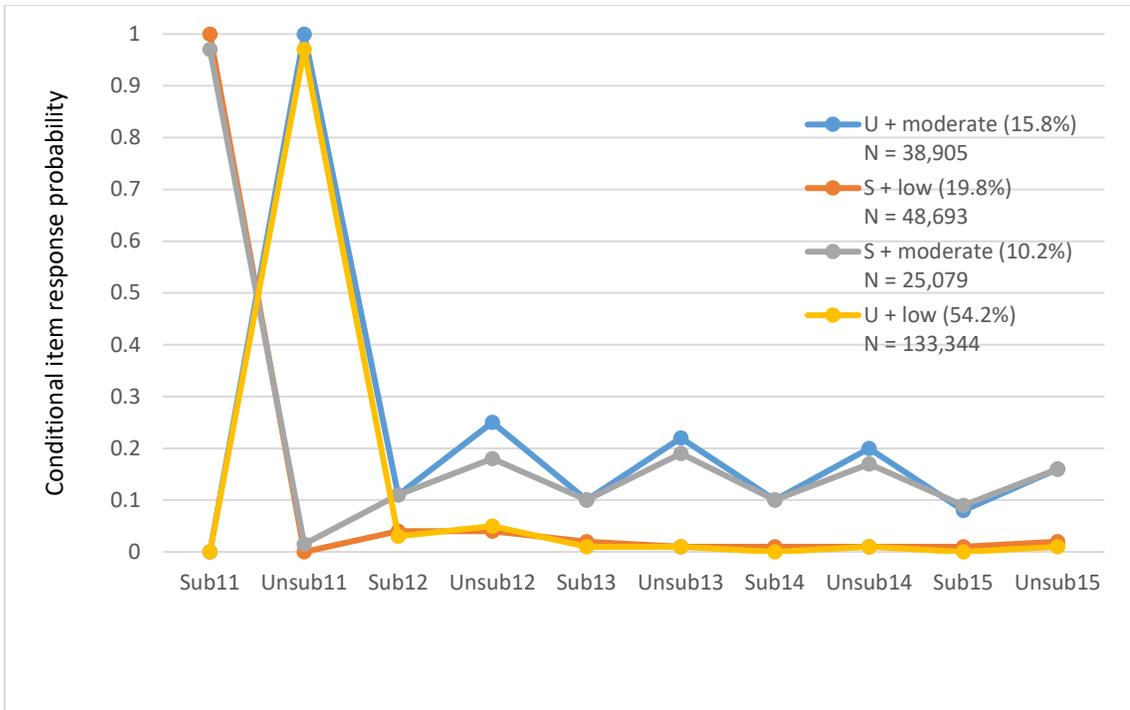
| Services latent class                 | Total reports            | Substantiated reports   | Unsubstantiated reports |
|---------------------------------------|--------------------------|-------------------------|-------------------------|
| Resources, treatment, FP<br>n = 5,427 | .79 (1.14) <sub>a</sub>  | .25 (.55) <sub>a</sub>  | .45 (.82) <sub>a</sub>  |
| Resources, treatment, FC<br>n = 6,095 | .82 (1.32) <sub>a</sub>  | .28 (.65) <sub>b</sub>  | .47 (.98) <sub>a</sub>  |
| FC<br>n = 14,819                      | .85 (1.38) <sub>ab</sub> | .22 (.55) <sub>c</sub>  | .55 (1.05) <sub>b</sub> |
| None<br>n = 78,668                    | .95 (1.52) <sub>c</sub>  | .27 (.64) <sub>ab</sub> | .62 (1.17) <sub>c</sub> |
| Counseling + FP<br>n = 12,170         | .89 (1.38) <sub>b</sub>  | .27 (.61) <sub>ab</sub> | .50 (.98) <sub>a</sub>  |

*Note.* Standard deviations are in parentheses. FP = family preservation. FC = foster care. Means with unique subscripts differ by  $p < .01$  according to Tukey's Least Significant Difference test.



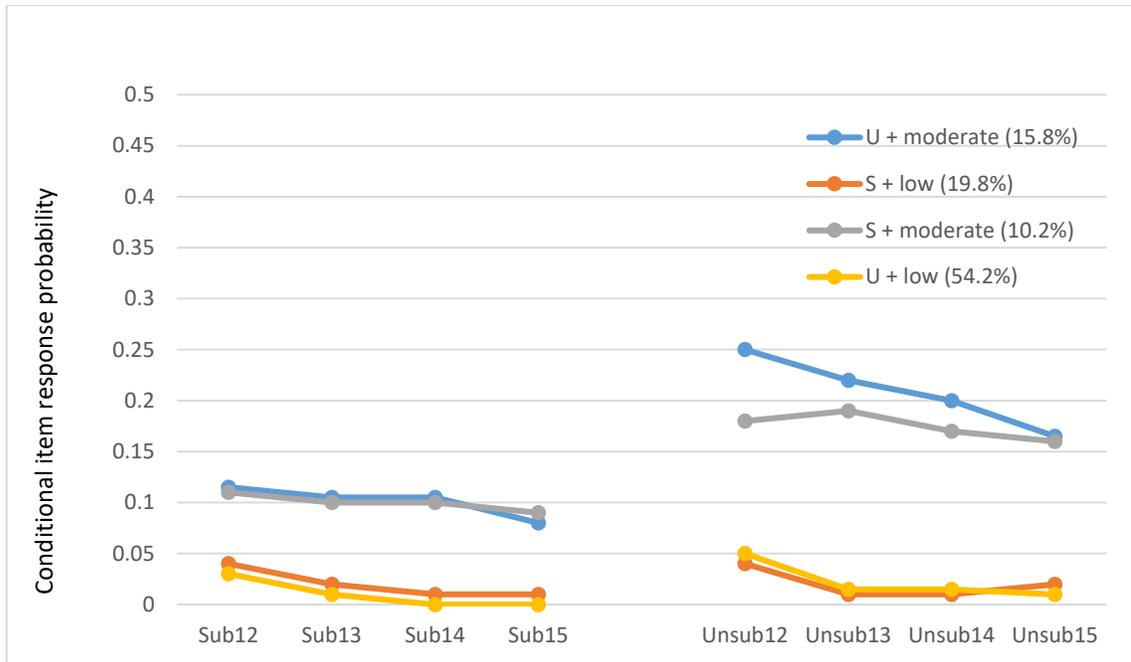
*Figure 1.* States retained in substantiation status latent class analysis.  
*Note.* Retained states are marked in blue.





*Figure 3.* Latent classes of substantiation status.

*Note.* Conditional item response probabilities of the four substantiation status latent classes from 2011-2015. U = Unsubstantiated. S + Substantiated.



*Figure 4.* Latent classes of substantiation status, 2011 omitted.

*Note.* Conditional item response probabilities of the four substantiation status latent classes from 2012-2015, x-axis separated by substantiation status. U = Unsubstantiated. S + Substantiated.

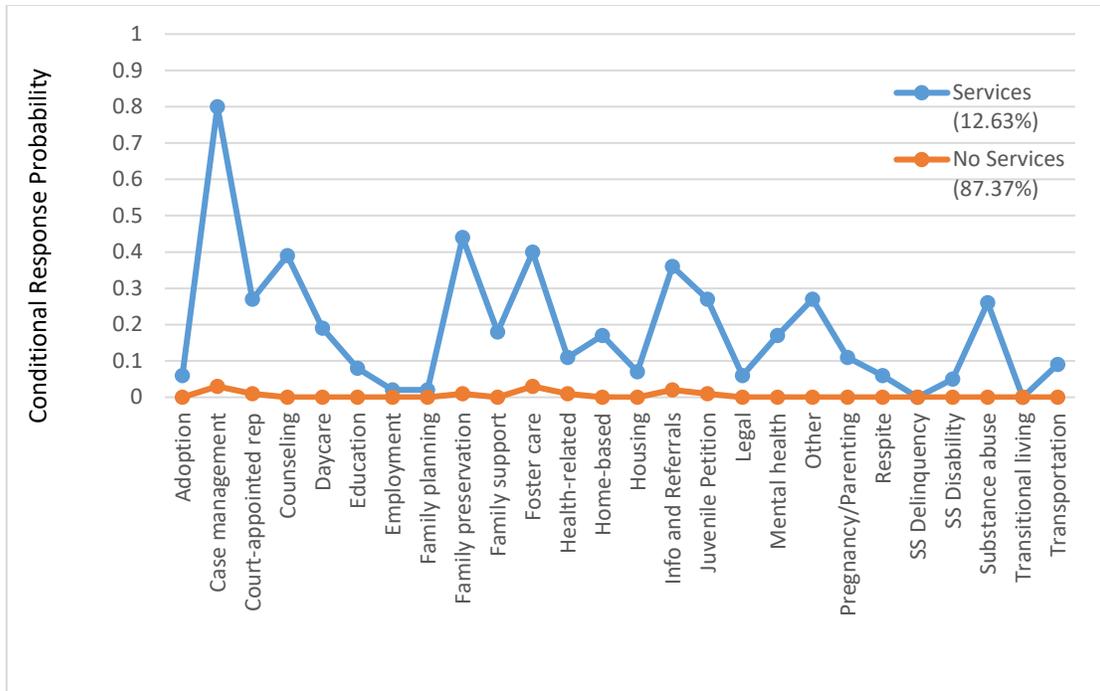


Figure 5. Latent classes of service provision.

Note. Conditional item response probabilities for services provided from 2011-2015.

## References

- Anda, R.F., Brown, D.W., Dube, S.R., Bremner, J.D., Felitti, V.J., Giles, W.H. (2008). Adverse childhood experiences and chronic obstructive pulmonary disease in adults. *American Journal of Preventive Medicine*, *34*, 396-403.
- Brown, D.W., Anda, R.F., Tiemeier, H., Felitti, V.J., Edwards, V.J., Croft, J.B., & Giles, W.H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine*, *37*, 389-396.
- Casanueva, C., Dolan, M., Smith, K., & Ringeisen, H. (2012). NSCAW Child Well-Being Spotlight: Children with Substantiated and Unsubstantiated Reports of Child Maltreatment are at Similar Risk for Poor Outcomes. OPRE Report #2012-31, Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.
- Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification*, *13*, 195–212.
- Currie, J. & Widom, C. S. (2010). Long-term consequences of child abuse and neglect on adult economic well-being. *Child Maltreatment*, *15*, 111-120.
- Child Welfare Information Gateway (2003). Decision-Making in Unsubstantiated Child Protective Services Cases: Synthesis of Recent Research. Washington, DC: U.S. Department of Health and Human Services. Retrieved from <https://www.childwelfare.gov/pubPDFs/decisionmaking.pdf>
- Dakil, S. R., Sakai, C., Lin, H., & Flores, G. (2011). Recidivism in the child protection system: identifying children at greatest risk of reabuse among those remaining in the home. *Archives of Pediatrics & Adolescent Medicine*, *165*, 1006–1012. <https://doi.org/10.1001/archpediatrics.2011.129>
- Drake, B., Jonson-Reid, M., & Sapokaite, L. (2006). Re-reporting of child maltreatment: does participation in other public sector services moderate the likelihood of a second maltreatment report? *Child Abuse & Neglect*, *30*, 1201–1226. <https://doi.org/10.1016/j.chiabu.2006.05.008>
- Drake, B., Jonson-Reid, M., & Kim, H. (2017). Surveillance bias in child maltreatment: a tempest in a teapot. *International Journal of Environmental Research and Public Health*, *14*: E971. <https://doi.org/10.3390/ijerph14090971>
- Drake, B., Jonson-Reid, M., Way, I., & Chung, S. (2003). Substantiation and recidivism. *Child Maltreatment*, *8*, 248–260. <https://doi.org/10.1177/1077559503258930>

- Dube, S.R., Fairweather, D., Pearson, W.S., Felitti, V.J., Anda, R.F., & Croft, J.B. (2009). Cumulative childhood stress and autoimmune diseases in adults. *Psychosomatic Medicine*, *71*, 243-250. <https://doi.org/10.1097/psy.0b013e3181907888>
- Dube, S. R., Williamson, D. F., Thompson, T., Felitti, V. J., & Anda, R. F. (2004). Assessing the reliability of retrospective reports of adverse childhood experiences among adult HMO members attending a primary care clinic. *Child Abuse & Neglect*, *28*, 729–737. <https://doi.org/10.1016/j.chiabu.2003.08.009>
- Eastman, A. L., Mitchell, M. N., & Putnam-Hornstein, E. (2016). Risk of re-report: A latent class analysis of infants reported for maltreatment. *Child Abuse & Neglect*, *55*, 22–31. <https://doi.org/10.1016/j.chiabu.2016.03.002>
- English, D. J., Graham, J. C., Litrownik, A. J., Everson, M., & Bangdiwala, S. I. (2005). Defining maltreatment chronicity: are there differences in child outcomes? *Child Abuse & Neglect*, *29*, 575–595. <https://doi.org/10.1016/j.chiabu.2004.08.009>
- Escaravage, J. H. (2014). Child maltreatment entrenched by poverty: How financial need is linked to poorer outcomes in family preservation. *Child Welfare*, *93*(1), 79-98. Retrieved from <https://search.proquest.com/docview/1804471271?accountid=14679>
- Fang, X., Brown, D. S., Florence, C. S., & Mercy, J. A. (2012). The economic burden of child maltreatment in the United States and implications for prevention. *Child Abuse and Neglect*, *36*, 156-65. <https://doi.org/10.1016/j.chiabu.2011.10.006>
- Felitti, V., Anda, R., Nordenberg, D., Williamson, D., Spitz, A., Edwards, V.,... Marks, J. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine* *14*, 245-258. [https://doi.org/10.1016/S0749-3797\(98\)00017-8](https://doi.org/10.1016/S0749-3797(98)00017-8)
- Fluke, J. D., Shusterman, G. R., Hollinshead, D. M., & Yuan, Y.-Y. T. (2005). *Rereporting and Recurrence of Child Maltreatment: Findings from NCANDS*. Retrieved from <https://aspe.hhs.gov/report/rereporting-and-recurrence-child-maltreatment-findings-ncands>
- Fluke, J. D., Shusterman, G. R., Hollinshead, D. M., & Yuan, Y.-Y. T. (2008). Longitudinal Analysis of Repeated Child Abuse Reporting and Victimization: Multistate Analysis of Associated Factors. *Child Maltreatment*, *13*, 76–88. <https://doi.org/10.1177/1077559507311517>
- Geiser, C. (2013). *Data analysis with Mplus*. New York: Guilford Press.

- Havlicek, J. (2014). Maltreatment histories of foster youth exiting out-of-home care through emancipation: a latent class analysis. *Child Maltreatment, 19*, 199–208. <https://doi.org/10.1177/1077559514539754>
- Heckman, J.J. (2008). Role of income and family influence on child outcomes. *Annals of the New York Academy of Sciences, 1136*, 307–323. <https://doi.org/10.1196/annals.1425.031>
- Heleniak, C., Jenness, J. L., Stoep, A. V., McCauley, E., & McLaughlin, K. A. (2016). Childhood Maltreatment Exposure and Disruptions in Emotion Regulation: A Transdiagnostic Pathway to Adolescent Internalizing and Externalizing Psychopathology. *Cognitive Therapy and Research, 40*, 394–415. <https://doi.org/10.1007/s10608-015-9735-z>
- Johnson, K. & O'Connor, D. *Post-implementation examination of a risk assessment's ability to classify families by the likelihood of subsequent child protective services involvement: a report for Washington Children's Administration*. Madison, WI: Children's Research Center.
- Jonson-Reid, M., Drake, B., Chung, S., & Way, I. (2003). Cross-type recidivism among child maltreatment victims and perpetrators. *Child Abuse & Neglect, 27*, 899–917. [https://doi.org/10.1016/S0145-2134\(03\)00138-8](https://doi.org/10.1016/S0145-2134(03)00138-8)
- Jonson-Reid, M., Kohl, P. L., & Drake, B. (2012). Child and adult outcomes of chronic child maltreatment. *Pediatrics, 129*(5), 839–845. <https://doi.org/10.1542/peds.2011-2529>
- Kim, H., Wildeman, C., Jonson-Reid, M., & Drake, B. (2017). Lifetime Prevalence of Investigating Child Maltreatment among US Children. *American Journal of Public Health, 107*, 274–280. <https://doi.org/10.2105/AJPH.2016.303545>
- Kohl, P. L., Jonson-Reid, M., & Drake, B. (2009). Time to leave substantiation behind: findings from a national probability study. *Child Maltreatment, 14*, 17–26. <https://doi.org/10.1177/1077559508326030>
- Kotch, J. B., Lewis, T., Hussey, J. M., English, D., Thompson, R., Litrownik, A. J., ... Dubowitz, H. (2008). Importance of early neglect for childhood aggression. *Pediatrics, 121*(4), 725–731. <https://doi.org/10.1542/peds.2006-3622>
- Lanier, P., Jonson-Reid, M., Stahlschmidt, M. J., Drake, B., & Constantino, J. (2010). Child Maltreatment and Pediatric Health Outcomes: A Longitudinal Study of Low-income Children. *Journal of Pediatric Psychology, 35*, 511–522. <https://doi.org/10.1093/jpepsy/jsp086>
- Lauterbach, D., & Armour, C. (2016). Symptom Trajectories among Child Survivors of Maltreatment: Findings from the Longitudinal Studies of Child Abuse and Neglect

- (LONGSCAN). *Journal of Abnormal Child Psychology*, 44, 369–379.  
<https://doi.org/10.1007/s10802-015-9998-6>
- Little, R. J. A. & Rubin, D. B. (2002). *Statistical Analysis with Missing Data: Second Edition*. New York: John Wiley & Sons.
- Macchione, N., Wooten, W., Yphantides, N., & Howell, J. R. (2013). Integrated health and human services information systems to enhance population-based and person-centered service. *American Journal of Preventive Medicine*, 45, 373–374.  
<https://doi.org/10.1016/j.amepre.2013.06.001>
- McCutcheon, A. L. (1987). *Quantitative Applications in the Social Sciences: Vol. 64. Latent class analysis*. Thousand Oaks, CA: Sage Publications.
- McLeer, S. V., Dixon, J. F., Henry, D., Ruggiero, K., Escovitz, K., Niedda, T., & Scholle, R. (1998). Psychopathology in non-clinically referred sexually abused children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 37, 1326–1333.  
<https://doi.org/10.1097/00004583-199812000-00017>
- Mills, R., Scott, J., Alati, R., O’Callaghan, M., Najman, J. M., & Strathearn, L. (2013). Child maltreatment and adolescent mental health problems in a large birth cohort. *Child Abuse & Neglect*, 37, 292–302. <https://doi.org/10.1016/j.chiabu.2012.11.008>
- Muthén, B. (2011). *Applications of causally defined direct and indirect effects in mediation analysis using SEM in Mplus*. Los Angeles, CA: Muthén & Muthén.
- Muthén, L.K. and Muthén, B.O. (1998-2012). *Mplus user’s guide* (7<sup>th</sup> ed.). Los Angeles, CA: Muthén & Muthén.
- Muthén, B., Muthén, L. & Asparouhov, T. (2016). *Regression and Mediation Analysis Using Mplus*. Los Angeles, CA: Muthén & Muthén.
- National Quality Improvement Center (2011). Differential response in child protective services: A guide for judges and judicial officers. Retrieved from <http://www.ucdenver.edu/academics/colleges/medicalschoo/department/pediatrics/subs/can/DR/qicdr/General%20Resources/resources/judgesguide.pdf>
- Nittle, N. K. (2018, March 12). Which U.S. States have the highest minority populations? *Thought Co*. Retrieved from <https://www.thoughtco.com/states-with-majority-minority-populations-2834515>
- Nguyen, H. T., Dunne, M. P., & Le, A. V. (2010). Multiple types of child maltreatment and adolescent mental health in Viet Nam. *Bulletin of the World Health Organization*, 88, 22–30. <https://doi.org/10.2471/BLT.08.060061>

- Paiz, J., M., Angeli, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M.,... & Keck, R. (2018, February 21). *General format*. Retrieved from <http://owl.english.purdue.edu/owl/resource/560/01/>
- Proctor, L. J., Aarons, G. A., Dubowitz, H., English, D. J., Lewis, T., Thompson, R., ... Roesch, S. C. (2012). Trajectories of Maltreatment Re-Reports from Ages 4 to 12: Evidence for Persistent Risk after Early Exposure. *Child Maltreatment, 17*(3), 207–217. <https://doi.org/10.1177/1077559512448472>
- Sedlak, A. J., & Broadhurst, D. D. (1996). *The Third National Incidence Study of Child Abuse and Neglect*. Retrieved September 13, 2017, from <https://www.childwelfare.gov/topics/systemwide/statistics/nis/>
- Sedlak, A.J., Mettenburg, J., Basena, M., Petta, I., McPherson, K., Greene, A., and Li, S. (2010). *The Fourth National Incidence Study of Child Abuse and Neglect (NIS-4): Report to Congress*. Retrieved April 29, 2018, from <https://www.acf.hhs.gov/opre/resource/fourth-national-incidence-study-of-child-abuse-and-neglect-nis-4-report-to>
- Shaffer, A., Huston, L., & Egeland, B. (2008). Identification of child maltreatment using prospective and self-report methodologies: A comparison of maltreatment incidence and relation to later psychopathology. *Child Abuse & Neglect, 32*, 682–692. <https://doi.org/10.1016/j.chiabu.2007.09.010>
- Thibodeau, E. L., Cicchetti, D., & Rogosch, F. A. (2015). Child maltreatment, impulsivity, and antisocial behavior in African American children: Moderation effects from a cumulative dopaminergic gene index. *Development and Psychopathology, 27*, 1621–1636. <https://doi.org/10.1017/S095457941500098X>
- United States Department of Health and Human Services & Administration for Children and Families (2008). *Child Welfare Outcomes 2002–2005: Report to Congress*. Retrieved April 29, 2018, from [www.acf.dhhs.gov/programs/cb/pubs/cwo05/chapters/executive.htm](http://www.acf.dhhs.gov/programs/cb/pubs/cwo05/chapters/executive.htm)
- United States Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children’s Bureau. (2017). *Child Maltreatment 2015*. Retrieved from <https://www.acf.hhs.gov/cb/resource/child-maltreatment-2015>
- Vachon, D. D., Krueger, R. F., Rogosch, F. A., & Cicchetti, D. (2015). Assessment of the Harmful Psychiatric and Behavioral Effects of Different Forms of Child Maltreatment. *JAMA Psychiatry, 72*, 1135–1142. <https://doi.org/10.1001/jamapsychiatry.2015.1792>
- Vaithianathan, R., Maloney, T., Putnam-Hornstein, E., & Jiang, N. (2013). Children in the public benefit system at risk of maltreatment: identification via predictive

- modeling. *American Journal of Preventive Medicine*, 45, 354–359.  
<https://doi.org/10.1016/j.amepre.2013.04.022>
- Van Neil, C., Pachter, L.M., Wade, R., Felitti, V.J., Stein, M.T. (2014). Adverse events in children: predictors of adult physical and mental conditions. *Journal of Developmental and Behavioral Pediatrics*, 35, 549-551.  
<https://doi.org/10.1097/DBP.000000000000102>
- Waldfoegel, J. (2009). Prevention and the child protection system. *The Future of Children*, 19(2), 195–210. Retrieved from  
<https://search.proquest.com/docview/1519298548/fulltextPDF/6207B17F24F64F64PQ/3?accountid=14679>
- Wekerle, C., Wall, A.-M., Leung, E., & Trocmé, N. (2007). Cumulative stress and substantiated maltreatment: the importance of caregiver vulnerability and adult partner violence. *Child Abuse & Neglect*, 31, 427–443.  
<https://doi.org/10.1016/j.chiabu.2007.03.001>
- Widom, C. S., & Morris, S. (1997). Accuracy of adult recollections of childhood victimization, Part 2: Childhood sexual abuse. *Psychological Assessment*, 9, 34–46.  
<https://doi.org/10.1037/1040-3590.9.1.34>
- Widom, C. S., Raphael, K. G., & DuMont, K. A. (2004). The case for prospective longitudinal studies in child maltreatment research: commentary on Dube, Williamson, Thompson, Felitti, and Anda (2004). *Child Abuse & Neglect*, 28, 715–722.  
<https://doi.org/10.1016/j.chiabu.2004.03.009>
- Widom, C. S. & Shepard, R. L. (1996). Accuracy of adult recollections of childhood victimization: Part 1: Childhood physical abuse. *Psychological Assessment*, 8, 412-421. Retrieved from <https://www.ncjrs.gov/App/publications/abstract.aspx?ID=166613>
- Wildeman, C., Emanuel, N., Leventhal, J. M., Putnam-Hornstein, E., Waldfoegel, J., & Lee, H. (2014). The prevalence of confirmed maltreatment among US children, 2004 to 2011. *JAMA Pediatrics*, 168, 706–713. <https://doi.org/10.1001/jamapediatrics.2014.410>
- Williams, L. M. (1994). Recall of childhood trauma: A prospective study of women's memories of child sexual abuse. *Journal of Consulting and Clinical Psychology*, 62, 1167-1176. Retrieved from  
<https://search.proquest.com/docview/614317582?accountid=14679>
- Williams-Mbengue, N., Ramirez-Fry, K., & Crane, K. (2015). *Differential response in child protective services: an analysis of state legislative provisions*. Retrieved from National Conference of State Legislatures website: <http://www.ncsl.org/research/human-services/state-legislation-differential-response.aspx>

## Appendix A

### Service Provision Variables

| Service name                 | Definition   |
|------------------------------|--|
| Family Support Services      | Family support services are primarily community-based preventative activities designed to alleviate stress and promote parental competencies and behaviors that will increase the ability of families to successfully nurture their children; enable families to use other resources and opportunities available in the community; and create supportive networks to enhance child-rearing abilities of parents and help compensate for the increased social isolation and vulnerability of families.  |
| Family Preservation Services | Family preservation services typically are services designed to help families alleviate crises that might lead to out-of-home placement of children; maintain the safety of children in their own homes; support families preparing to reunify or adopt; and assist families in obtaining services and other supports necessary to address their multiple needs in a culturally sensitive manner. (If a child cannot be protected from harm without placement or the family does not have adequate strengths on which to build, family preservation services are not appropriate.  |
| Foster Care Services         | Services or activities associated with 24 hour substitute care for all children placed away from their parents or guardians and for whom the State agency has placement and care responsibility. Note: This field indicates that this service began or continued for the child in the report as a result of the CPS response to reported allegations. The service has been delivered between the report date and 90 days after the disposition date of the report. The service continued past the Report Disposition Date. A foster parent is an individual who provides a home for orphaned, abused, neglected, delinquent or disabled children under |

|                                   |  |
|-----------------------------------|--|
|                                   | the placement, care or supervision of the State. The individual may be a relative or non-relative and need not be licensed by the State agency to be considered a foster parent.   |
| Juvenile Court Petition           | A legal document filed with the court of original jurisdiction overseeing matters affecting children, requesting that the court take action regarding the child's status as a result of the investigation; usually a petition requesting the child be declared a dependent or delinquent child, or that the child be placed in an out of home setting. |
| Court-Appointed Representative    | A person required to be appointed by the court to represent a child in a neglect or abuse proceeding. May be an attorney or a court-appointed special advocate (or both) and is often referred to as a guardian ad litem. Makes recommendations to the court concerning the best interests of the child.   |
| Adoption Services                 | Services or activities provided to assist in bringing about the adoption of a child.   |
| Case Management Services          | Services or activities for the arrangement, coordination, and monitoring of services to meet the needs of children and their families.   |
| Counseling Services               | Services or activities that apply the therapeutic processes to personal, family, situational or occupational problems in order to bring about a positive resolution of the problem or improved individual or family functioning or circumstances.  |
| Day Care Services                 | Services or activities provided in a setting that meets applicable standards of State and local law, in a center or in a home, for a portion of a 24-hour day.   |
| Educational and Training Services | Services provided to the victim and/or the family to improve knowledge or daily living skills and to enhance cultural opportunities.   |

|  |  |
|--|--|
| Employment Services                          | Services or activities provided to assist individuals in securing employment or acquiring of learning skills that promote opportunities for employment.  |
| Family Planning Services                     | Educational, comprehensive medical or social services or activities which enable individuals, including minors, to determine freely the number and spacing of their children and to select the means by which this may be achieved.  |
| Health-Related and Home Health Services      | Services to attain and maintain a favorable condition of health.   |
| Home-Based Services                          | In-home services or activities provided to individuals or families to assist with household or personal care activities that improve or maintain adequate family well-being. Includes homemaker services, chore services, home maintenance services and household management services. |
| Housing Services                             | Services or activities designed to assist individuals or families in locating, obtaining or retaining suitable housing.  |
| Independent and Transitional Living Services | Services and activities designed to help older youth in foster care or homeless youth make the transition to independent living.   |
| Information and Referral Services            | Services or activities designed to provide information about services provided by public and private service providers and a brief assessment of client needs (but not a diagnosis and evaluation) to facilitate appropriate referral to these community resources.                    |
| Legal Services                               | Services or activities provided by a lawyer, or other person(s) under the supervision of a lawyer, to assist individuals in seeking or obtaining legal help in civil matters such as housing, divorce, child support, guardianship, paternity and legal separation.                    |
| Mental Health Services                       | Services to overcome issues involving emotional disturbance or maladaptive behavior adversely  |

|  |   |
|--|---|
|  | <p>affecting socialization, learning, or development. Usually provided by public or private mental health agencies and includes residential services (inpatient hospitalization, residential treatment, and supported independent living) and non-residential services (partial day treatment, outpatient services, home-based services, emergency services, intensive case management and assessment).</p> |
| Pregnancy and Parenting Services       | <p>Services or activities for married or unmarried adolescent parents and their families to assist them in coping with social, emotional, and economic problems related to pregnancy and in planning for the future.</p>  |
| Respite Care Services                  | <p>Services involving temporary care of the child(ren) to provide relief to the caretaker. May involve care of the children outside of their own home for a brief period of time, such as overnight or for a weekend. Not considered by the State to be foster care or other placement.</p>   |
| Special Services – Disabled            | <p>Services for persons with developmental or physical disabilities, or persons with visual or auditory, impairments, or services or activities to maximize the potential of persons with disabilities, help alleviate the effects of physical, mental or emotional disabilities, and to enable these persons to live in the least restrictive environment possible.</p>                                    |
| Special Services – Juvenile Delinquent | <p>Services or activities for youth (and their families) who are, or who may become, involved with the juvenile justice system.</p>   |
| Substance Abuse Services               | <p>Services or activities designed to deter, reduce, or eliminate substance abuse or chemical dependency.</p>   |
| Transportation Services                | <p>Services or activities that provide or arrange for travel, including travel costs of individuals, in order to access services, or obtain medical care or employment.</p>   |

Other Services

Services or activities that have been provided to the child victim or family of the child victim, but which are not included in the services listed in the NCANDS record layout.

## Appendix B

### Distributions of Report Status Per Year Based on Prior Year Status

Table 1a

*Distribution of 2012 Report Status Per 2011 Report Status*

| 2011 report status | 2012      |        |        |      |
|--------------------|-----------|--------|--------|------|
|                    | No report | Only U | Only S | Both |
| Only U             | 83.4%     | 11.4%  | 3.8%   | 1.4% |
| Only S             | 84.6%     | 9.1%   | 5.1%   | 1.2% |
| Both               | 70.8%     | 17.5%  | 7.6%   | 4.0% |

*Note.* U = Unsubstantiated. S = Substantiated. Both = Substantiated and Unsubstantiated.

Table 1b

*Distribution of 2015 Report Status Per 2011 Report Status*

| 2011 report status | 2015      |        |        |      |
|--------------------|-----------|--------|--------|------|
|                    | No report | Only U | Only S | Both |
| Only U             | 91.4%     | 5.8%   | 2.0%   | 0.7% |
| Only S             | 89.2%     | 6.9%   | 3.1%   | 0.9% |
| Both               | 82.3%     | 11.1%  | 4.2%   | 2.3% |

*Note.* U = Unsubstantiated. S = Substantiated. Both = Substantiated and Unsubstantiated.

Table 1c

*Distribution of 2013 Report Status Per 2012 Report Status*

| 2012 report status | 2013      |        |        |      |
|--------------------|-----------|--------|--------|------|
|                    | No report | Only U | Only S | Both |
| No report          | 90.5%     | 6.2%   | 2.6%   | 0.7% |
| Only U             | 72.5%     | 18.2%  | 6.6%   | 2.7% |
| Only S             | 77.6%     | 13.0%  | 7.2%   | 2.3% |
| Both               | 65.2%     | 21.4%  | 8.5%   | 5.0% |

*Note.* U = Unsubstantiated. S = Substantiated. Both = Substantiated and Unsubstantiated.

Table 1d  
*Distribution of 2014 Report Status Per 2013 Report Status*

| 2013 report status | 2014      |        |        |      |
|--------------------|-----------|--------|--------|------|
|                    | No report | Only U | Only S | Both |
| No report          | 91.9%     | 5.4%   | 2.1%   | 0.5% |
| Only U             | 71.2%     | 18.6%  | 6.6%   | 3.5% |
| Only S             | 75.8%     | 14.2%  | 7.5%   | 2.5% |
| Both               | 62.8%     | 21.7%  | 9.5%   | 6.1% |

*Note.* U = Unsubstantiated. S = Substantiated. Both = Substantiated and Unsubstantiated.

Table 1e  
*Distribution of 2015 Report Status Per 2014 Report Status*

| 2014 report status | 2015      |        |        |      |
|--------------------|-----------|--------|--------|------|
|                    | No report | Only U | Only S | Both |
| No report          | 92.6%     | 5.0%   | 1.9%   | 0.5% |
| Only U             | 71.6%     | 18.9%  | 6.2%   | 3.3% |
| Only S             | 75.8%     | 14.2%  | 7.4%   | 2.5% |
| Both               | 61.3%     | 22.2%  | 9.5%   | 6.9% |

*Note.* U = Unsubstantiated. S = Substantiated. Both = Substantiated and Unsubstantiated.