



Caregiver physical health and child maltreatment reports and rereports

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ABSTRACT

This study examined the relationship between caregiver health problems and maltreatment occurrence and recurrence, extending the limited prior research in this area. Data sources included the National Longitudinal Study of Adolescent to Adult Health and a regional longitudinal administrative data study of low income children with or without official reports of maltreatment and caregiver health diagnoses. Research questions addressed the relationship of caregiver health to child maltreatment occurrence and recurrence, with an additional emphasis on effects for younger and older children. Multinomial and Cox regression models were constructed to evaluate the research questions. Key findings included that poor caregiver health was associated with increased risk of neglect across both datasets used. In models of recurrence, caregiver health remained important, but only for families not receiving services after the initial report. Key implications of this study include the desirability of providing effective health services to families at risk for child maltreatment, and that any resultant improvements in caregiver health may result in attenuation of child maltreatment risk.

1. Introduction

Child maltreatment onset is associated with a range of substantial personal and societal costs (Fang, Brown, Florence, & Mercy, 2012; Peterson et al., 2018) and the increased risk of poor outcomes appears greater when maltreatment recurs (Jaffee & Maikovich-Fong, 2011; Jonson-Reid, Kohl, & Drake, 2012). Research indicates a strong association between the experience of maltreatment or other adverse childhood experiences and later poor physical health (Chartier, Walker & Naimark, 2010; Corso, Edwards, Fang, & Mercy, 2008; Lanier, Jonson-Reid, Stahlschmidt, Drake, & Constantino, 2009). Further, several studies have found an association between poor physical health and other caregiver risk factors for child maltreatment like mental illness (DeHert et al., 2011; Koran et al., 1989; Mäkikyrö et al., 1998; Scott et al., 2007). Research examining the possible association of caregiver physical health to maltreating behaviors or reports of maltreatment, however, is rare. Most research on caregiver impairment has focused on the association of mental health and substance abuse with maltreating behaviors without considering physical health conditions (Chung, McCollum, Elo, Lee, & Culhane, 2004; Drake, Jonson-Reid, & Sapokaite, 2006; Hindley, Ramchandani, & Jones, 2006; Jaudes & Mackey-Bilaver, 2008; Kohl, Jonson-Reid, & Drake, 2011; Kotch et al., 1995; Kotch, Browne, Dufort, Winsor, & Catellier, 1999; Strathearn, Mamun, Najman & O'Callaghan 2009; Windham et al., 2004; Wu et al.,

2004).

Slack et al. (2011) examined the role of the caregivers' physical health in relation to maltreatment occurrence among young children. Their paper included data from three large studies of non-child protective services involved families, including Fragile Families and Child Wellbeing (FFCW), Healthy Families New York (HFNY) and Illinois Families Study-Child Wellbeing (IFS-CWB). They found that there was a bivariate association with caregiver physical health and neglect among young children in two of the three studies. It is possible that poor caregiver health may be a barrier to accessing services and attending to safety needs identified in a first report even if it is not a strong predictor of initial occurrence. A few articles have controlled for some measure of caregiver health in modelling recurrent maltreatment with mixed findings depending on data source, whether recurrence was limited to substantiated re-reports and the type of measure for health and maltreatment outcomes (Casanueva et al., 2015; Dakil, Sakai, Lin, & Flores, 2011; Jedwab, Harrington, & Dubowitz, 2017; Kahn & Schwalbe, 2010; Palusci, 2011).

In an era of heightened attention to health care and health care reform (Wong, Perrin, & McClellan, 2018), it is important to understand the potential association between a caregiver's health and their ability to parent effectively. Given the heightened physical and cognitive vulnerability in early childhood and the higher prevalence of known maltreatment (US DHHS, 2019; Shonkoff & Levitt, 2010) within this

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age group, it is particularly important to understand how this may vary among families with younger children. Aim one of the present study builds on the work of Slack et al. (2011) which used multiple data sets to examine the relationship of caregiver health and maltreatment among young children. The present study extends this work with two samples under age 12 at baseline using two unique datasets offering greater range in age of onset, type of health measure and ability to include children not low income at baseline. Aim 2 focuses on extending this exploration to recurrent maltreatment and caregiver health by examining recurrent contact with CPS for all children under age 12 and then restricting the sample to those with first reports in early childhood.

2. Background

While little work has looked at caregiver health as a risk factor for maltreatment, there are a few studies that have examined perceptions of health among caregivers involved in child protective services (CPS). About 40 years ago, Conger and colleagues (1979) found parents involved with CPS reported worse physical health than socioeconomically matched controls who were not involved with CPS. About fifteen years later, a study also found lower self-reported health scores among caregivers who are involved with CPS compared to the general U.S. adult population- although the difference was not large (Ware, Kosinski, & Keller, 1996). A more recent study found that 60.2% of caregivers involved with CPS self-reported that they were not in very good or excellent health in the second National Survey of Child and Adolescent Well-Being (NSCAW II) (Schiller, Lucas, Ward, & Peregoy, 2012). This is much higher than the percent (39%) of similarly aged adults in the general population who reported they were not in very good or excellent health in the 2012 National Health Interview Survey (Blackwell et al., 2014). These studies, however, did not provide information on the type of health problems nor could they examine the association with initial or recurrent maltreatment.

Caregivers' physical health and risk of maltreatment. Many studies of both maltreatment occurrence and recurrence are guided by some form of the ecological framework sometimes augmented with additional theories or perspectives related to family or community level stressors (Jonson-Reid et al., 2019; Slack et al., 2011). While the present study design was based upon prior work rather than testing theoretical constructs, a brief rationale is offered for why a caregiver's physical health may be associated with maltreatment and/or recurrent contacts with CPS once maltreatment occurs. Hypothetically, poor health could impact caregiving directly by influencing the capacity to supervise or to participate in caretaking behaviors-particularly if there are no resources (e.g., partner or professional service) to offset any impairment. Physical health could also impact maltreatment indirectly through interfering with employment and increasing financial strain (Millett et al., 2016). It is also possible that any effect is actually related to the fact that mental health and physical health problems are often comorbid (DeHert et al., 2011; Scott et al., 2007).

While some early studies found that poor caregiver health was associated with lower quality parenting (Anderson & Hammen, 1993; Armistead, Klein, & Forehand, 1995), that is not the same as demonstrating that poor health results in child abuse or neglect. Further, the risk for abuse or neglect related to caregiver physical impairment may vary by child age. An older child or adolescent may be able to assist with household tasks and readiness for school, while preschool or younger children cannot care for themselves. Slack et al. (2011) analyzed data from three studies of low-income families with young children and found a bivariate association between caregiver's chronic physical health condition and onset of official reports of neglect. When the outcome was measured by the caregiver self-report of neglect, the relationship was only significant (and of lower magnitude) in one of the two studies. In all cases, the relationship became non-significant in multivariate models.

2.1. Caregivers' physical health and recurrence of child maltreatment

Given the significant personal and societal costs of reported maltreatment and the increased risk of poor outcomes associated with recurrence (Fang et al., 2012; Jonson-Reid et al., 2012), a better understanding of how parental physical health impacts ongoing contact with child protective services is important. There are a few studies of recurrent maltreatment that have controlled for caregiver health in some way, both measures and findings are inconsistent.

Three studies analyzed data drawn from the First or Second National Child and Adolescent Well-being study (NSCAW I or II) but did not exclude cases with reports prior to baseline. Thus the recurrent report could be a second report, third, etc. Kahn and Schwalbe (2010) analyzed recurrence separately for unsubstantiated and substantiated baseline cases (in NSCAW I) and found a higher likelihood of caseworker reported recurrence for caregivers with self-reported poor health status. Dakil and colleagues (2011) also analyzed recurrent reporting in NSCAW I and found a significant bivariate association with caregivers report of having limited ability to work in past 4 weeks due to health concerns, but it was not significant in multivariate models. Casanueva and colleagues (2015) analyzed NSCAW II and found that caregiver self-reported poor health status predicted lower risk of a caseworker's report of recurrent maltreatment, but was not associated with an official report of recurrence. Generally, younger children had greater risk of recurrence across studies.

Two other studies examined recurrence using different data sets with a focus on children who were under age five. Palusci (2011) used the national CPS reporting data (NCANDS) which has an indicator for medical problems of the caretaker taken from the risk assessment protocol from a given state. This study modelled substantiated recurrence separately by age at a first substantiated report. There was no association between caregiver health and a later substantiated rereport among children age 5 or less at baseline. A final study used data from the LONGSCAN study (a merger of 5 different studies with differing baseline involvement with CPS) with young children that had record of at least one unsubstantiated CPS report and found no significant association between self-reported caregiver health and later substantiated reports. Both studies of young children focused only on substantiated recurrence which is of concern given research that suggests unsubstantiated cases still include significant risk to the child and carry longterm costs (Drake, Jonson-Reid, Way, & Chung, 2003; Fang et al., 2012; Kohl, Jonson-Reid, & Drake, 2009; Kugler et al., 2019).

2.2. The present study

Understanding both the onset of maltreatment and recurrent maltreatment is key to informing preventive interventions and child welfare policy. To do this, two data sets are used. The first is the National Longitudinal Study of Adolescent to Adult Health (Add Health) which is not limited to low-income youth and includes youth self-report of maltreatment that occurred prior to sixth grade (about age 12) and self-reported caregiver chronic health problems. The second data set is a Midwestern region longitudinal administrative data study (hereafter named the 'Regional Study') of reported maltreatment (prior to age 12) and recurrent maltreatment among low-income families with caregiver health problems taken from diagnoses in medical claims records. The following two aims and three research questions guided the present investigation:

2.2.1. Aim 1

To understand if caregiver physical health predicts the occurrence of maltreatment by type in both low income and general population samples. **Question 1.** Are caregivers' perceptions or medical record of chronic physical health problems associated with child maltreatment prior to age 12 controlling for other demographic and risk factors?

2.2.2. Aim 2

To understand if caregiver health is associated with recurrence of maltreatment. Because it is not possible to examine this in Add Health, AIM 2 is restricted to the Regional Study. **Question 2.** Are caregivers' chronic health problems associated with a recurrent child maltreatment report? **Question 3.** Does caregiver health have a stronger impact on the recurrence of child maltreatment among young children (age 3 or under at first report)? The age at baseline for question three was chosen to be consistent with child reliance on a caregiver and two of the recurrence studies (Jedwab et al., 2017; Palusci, 2011).

3. Methods

Following the approach of Slack et al. (2011), more than one dataset was included in the present study to compare differing forms of reporting for both caregiver health and maltreatment outcomes. The baseline data collection timeframe is similar for both of the datasets used in the present analyses. The age at maltreatment was comparable to Add Health, but based on the official report rather than youth self-report. The national data set (Add Health) includes detailed survey information but relies on self-reported caregiver health and retrospective recall of maltreatment which may be biased (Widom, 2019). The Regional Study data offers the ability to track exact dates of maltreatment reports, census tract characteristics and health diagnoses, but is limited to maltreatment concerns that are officially reported and health problems that are treated. Similar to Slack et al. (2011), answers to questions two and three are restricted to outcomes for lower-income families. A description of each study follows.

3.1. Study samples

3.1.1. AIM 1: Sample one

Data were drawn from The National Longitudinal Study of Adolescent to Adult Health (Add Health), which is a nationally representative sample of adolescents in grades 7–12 in the United States (Harris et al., 2009). Two waves of data were merged and used. Wave I included the self-reported overall health condition on a Likert scale from the caregivers during 1994–95 that participated in the parent interviews. Wave III was conducted in 2001 and 2002 including information regarding retrospective recall of abuse prior to six grade (approximately age 12) after the subject had become an adult ($n = 6360$). Only subjects that included non-missing responses for maltreatment and caregiver health were included with $n = 2072$ subjects lost to analysis (final sample $n = 4288$). Data replacement methods were not used given the sizeable loss in subjects between waves and concerns about replacing information on the dependent variable—particularly when using logistic regression approaches to analyses (Allison, 2002). Neither caregiver health self-report nor adolescent self-report of maltreatment was based on standardized measures.

3.1.2. AIM 1: Sample two

The Regional Study sample included the universe of low-income children with a first report to CPS in 1993–1994 under the age of 12 of data from a large Midwest metropolitan region. Because of the difficulty in matching at the family level, one child per family was randomly selected. The comparison group was sampled during the same timeframe and included children with a history of family poverty but no maltreatment reports matched by age and city or county residence. Data were provided by multiple agencies including birth and death records, child protective services (CPS), state department of mental health records, Medicaid record, emergency room, income maintenance programs, shelters, juvenile court petitions, highway patrol arrest data, and state-level corrections data in a Midwest metropolitan region (described further in XXXX (omitted for blind review)). The present study focused on child protective services data, birth, and death records, child

and parent health data, and child and parent mental health data. All data with the exception of child special education information were statewide which minimizes the likelihood of loss of data due to movement out of the region. Data included exact dates of service or event allowing for prospective analyses. All data were de-identified before analysis. The full sample was used ($n = 10,035$).

3.1.3. AIM 2: Questions two & three

Only the Regional Study was able to capture recurrent maltreatment and so AIM 2 questions were limited to children with first reports of maltreatment from this study. For question two this included all children reported prior to age 12 ($n = 4956$). If children entered but exited care during the risk window they were retained with the exception of 13 children who were dropped from recurrence analyses as they entered care but exited to adoption or independent living and may not have had time at risk in the family of origin. For question three, only children with at least one report of maltreatment age three or under who did not enter and remain in foster care for the entire follow-up period were selected to look at recurrence for up to 3 years ($n = 2420$). This is the same baseline age range for Jedwab et al. (2017) and within a year of Palusci (2011) that examined through age four. The upper limit was set due to the desire to keep the risk period focused on very young children based on the same rationale as Slack et al. (2011).

3.2. Measures

To the extent possible, variables were chosen to replicate those included in multivariate models by Slack et al. (2011) for AIM 1 and in studies of recurrence for AIM 2.

3.2.1. Dependent variables

AIM 1: Question one. The dependent variable in sample one, Add Health, was taken from adolescent self-report of maltreatment when they were in 6th grade or younger. “History of Being Left Alone or Failure to Provide (basic Needs)” was coded as 1, “History of Being Physically or Sexually Maltreated” was coded as 2, and “No History of Maltreatment” was coded as 3.

The dependent variable in sample two, Regional Data for question 1 analyses was whether the child was officially reported to CPS due to alleged child maltreatment with a similar breakdown by type. In the regional study data, neglect included educational, medical and hygiene in addition to lack of supervision or failure to provide basic needs. In analyses of maltreatment type, “Neglect” was coded as 1 if the first CPS report included any type of neglect allegation.

AIM 2: Question two and three. The dependent variable for questions two and three were whether or not there was at least one repeat report of maltreatment two weeks or more following the baseline report. The lag between baseline and re-report was created to try to eliminate reports that might be echoes of the baseline report that were simply seen by a different reporter.

3.2.2. Independent and control variables

AIM 1: Sample one (Add Health). Caregivers' perception of their general physical health was the key independent variable. “Perception of Physical Health” was coded as 1 if a caregiver feels excellent, very good, or good about their physical health and 0 for fair and poor.

A number of control variables were also tested. “Unmet Health Care Needs” was coded as 1 if a caregiver replied somewhat hard, very hard and 0 for very easy and somewhat easy to have health care needs to be met. “Aid to Families with Dependent Children (AFDC)” was coded as 1 if a caregiver received the benefit and 0 otherwise. “Unemployment or Worker's Compensation” was coded as 1 if a caregiver replied yes and 0 otherwise. “Social Security” was coded as 1 if a caregiver received Social Security or Railroad Retirement and 0 otherwise. “Supplemental Security Income (SSI)” was coded as 1 if a caregiver received it and 0 otherwise. “Food stamps” were coded as 1 if a caregiver received the

benefit and 0 otherwise. All the above variables were collapsed into a single “poverty” indicator and were coded as 1 if a caregiver received any of the above and 0 otherwise. “Race” was coded as 0 if the caregiver was White, 1 as Black or African American, 2 as Hispanic and 3 otherwise. “Caregiver’s Education Background” was coded 1 for college or more and 0 otherwise. “Smoking” was coded as 1 if the caregiver reported himself/herself as a smoker and 0 otherwise. “Alcohol” was coded 1 if the caregiver reported drinking alcohol more than days a week and 0 otherwise.

Sample two (Regional Study). Caregiver health status was again the primary independent variable but was measured according to the presence or absence of a diagnosis of “Chronic or Serious Health Concern” in medical billing data. The variable was coded as 1 if a caregiver had a history of treatment for cancer, diabetes, chronic disorders such as epilepsy, or ongoing cardiac problems and 0 otherwise.

A number of control variables were tested. “Mental health and substance abuse” were coded as 1 if a caregiver had a history of treatment for a mental health disorder or substance abuse problems and 0 otherwise. “Cognitive delay” was coded as 1 if a caregiver had a health record of developmental problems and 0 otherwise. “Caregiver’s Education Background” was coded 1 for high school or more and 0 otherwise. “Race” was coded as 1 if the caregiver was African American (78%) and 0 otherwise (21% White). The entire sample was receiving public income support at baseline, but the age at first receipt of AFDC was controlled in case there was variation in risk associated with timing of income support. An attempt was made to control for the potential importance of community conditions associated with maltreatment (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007; Drake & Pandey, 1996). This was done by including median family income from the Census tract the subject resided in at baseline. This variable was dichotomized, scored as 1 when the tract median family income was at or below the 1990 federal poverty line. “Caregivers’ history of foster care” was coded 1 if the caregivers had ever been placed in foster care in their own childhood and 0 otherwise. Finally, child chronic or serious health problems (similar to adult categories), as well as birth or health record of cognitive delay, were controlled as additional potential sources of strain on the caregiver (Hibbard & Desch, 2007).

AIM 2: Questions Two and Three (Regional Study). The variables included in Question 1 analyses were retained, but controls for report disposition and child welfare services were added as well as controls for child age at first report, caregiver age at birth (under age 19 or not), and notation of caregiver stress on the baseline maltreatment report (‘1’ if marital conflict, parent-child conflict or intimate partner violence). Additionally, the presence of death records allowed for censoring out of children who died from analyses of recurrence. “Substantiation” was based on the official report disposition codes and coded as 1 if the first report was substantiated by CPS and 0 otherwise. “Family Centered Service (FCS)” was coded as a 1 if the family participated in voluntary in-home case management services following the first report, otherwise, as 0 (coded as 0 if case closed because the family was not participating or moved). “Family Preservation Services (FPS)” was coded as 1 if the family was provided with intensive family preservation services (typically court-ordered) following the first report, otherwise as a 0. “Foster care” was coded as 1 when a child entered foster care after the first report but exited during the follow-up window.

For question three, the sample was limited to very young children so age was recoded as infant compared to other as infancy is a particularly high-risk period for maltreatment (US DHHS, 2019). Also, child health and disability had to be collapsed into a single variable due to sample size.

3.3. Analytic strategy

All data were cleaned and coded using SAS 9.4. Descriptive information for Question 1 can be found in Table 1. Descriptive information for Questions 2 and 3 are included in the same tables as the

Table 1
AIM 1 Variables: Add Health and Regional Datasets.

	Sample 1	Sample 2
	Add Health (n = 4288)	Regional Data (n = 10,035)
Caregiver Factors	Self-report	Administrative Data
Race		
Black (ref: other)	23.4%	78.3%
White (ref: other)	57.5%	–
Hispanic (ref: other)	11.4%	–
Education (1 = high school or above)	54.5%	65.8%
Disability ¹ (1 = yes)	7.6%	0.7%
Alcohol (1 = yes)	3.6%	–
With MH* or SA* Dx (1 = yes)	–	7.0%
Foster Care History (1 = yes)	–	3.4%
Unmet Health Needs (1 = yes)	29.2%	–
Physical Health (1 = poor)	13.6%	–
Chronic/Serious Health Dx (1 = yes)	–	1.9%
Child’s Factors		
Health	6.8%	2.0%
Disability ²	0.6%	21.3%
SES Status		
Tract Median Income < 25 K	NA	67.6%
Family Poverty	–	100%
Age at first AFDC receipt	–	2.2yrs
Child Maltreatment (self-report)	Prior to 6th grade	
Neglect	45.9%	–
Physical	30.5%	–
Sexual	8.3%	–
Child Maltreatment (official report)		Before age 12
Neglect	–	34.1%
Physical	–	16.5%
Sexual	–	4.3%

Note: *MH = Mental Health, SA = Substance Abuse.

¹ Question 1 regional data limited to medical record of caregiver cognitive delay.

² Child disability in regional data includes medical and special education records.

multivariate analyses.

3.3.1. Question 1

Sample one (**Add Health**): In order to obtain data on maltreatment, Wave III responses containing retrospective youth recall had to be merged with Wave I which included all the remaining information modelled. A multinomial regression model evaluated how caregivers’ physical health problems were associated with the likelihood of self-reported childhood maltreatment (no maltreatment vs. neglect, physical/sexual abuse vs. neglect). The model was run in two stages. Models were run with control variables found in both datasets first and then re-run with additional controls that were specific to the data source. The second included additional variables related to health access, substance abuse, and poverty.

Sample two (**Regional Study**): Many of the data sets including income maintenance (AFDC) and child protection shared a common identifier. Other data were linked using a composite name/birthdate/gender match variable. Addresses were available in both the maltreatment and income maintenance data and were geocoded in order to link neighborhood (census tract) information from the US Census Bureau (STF3A and 1A files). Data definitions and recording practices were collected from each agency and preliminary links and data cleaning questions were reviewed with staff from each organization to assure understanding of definitions and how a variable was used in practice. Rates of overlap between systems were also shared with agencies and compared with research data or government documents as

an additional check for expected linkage rates across systems. Multinomial regression in SAS did not provide the capacity to address clustering by census tract. Logistic regression (PROC SURVEYLOGISTIC) was used on baseline data (controlling for clustering by census tract): no maltreatment vs. neglect and neglect vs. physical or sexual abuse. The procedure was designed to handle complex survey designs including clustering and provides robust standard errors based on using the correlations of Pearson residuals to develop robust standard errors (Allison, 2012). The advantage of this procedure with data with limited levels of clustering is that it still outputs odds ratios for interpretation. Models were run with control variables found in both datasets first and then re-run with additional controls available.

3.3.2. Question 2

Regional study: Cox regression was used (PROC SURVEYPHREG adjusting for clustering effects) to model maltreatment re-report over time (measured in months) among all children reported prior to age 12 for up to 16 years. The risk of recurrence was modelled based on time from any investigated baseline report to a second report (14 or more days later), or until the end of the risk period. Cases were censored as they turned age 18, if they died, or if they reached the end of data collection in 2009. Because the predictors for the model are based on the family of origin, time spent in foster care was censored out of the risk period as well. Proportionality was tested and where there were concerns, an interaction between the control variable and time was included (Allison, 2010). If the interaction was not statistically significant nor had a practical influence on the fit of the model it was dropped from the final model. Interactions between control variables were examined using PROC CATMOD to examine possible combinations to test in the Cox regression model. Decisions to include interactions followed the same rationale as that used for time interactions.

While prior studies of recurrence often disaggregated analyses by or limited to baseline substantiation (Casanueva et al., 2015; Dakil et al., 2011; Kahn & Schwalbe, 2010; Palusci, 2011), there is a substantial body of work suggesting that substantiated and unsubstantiated reports are similar in regard to potential harm to the child (Drake et al., 2003; Kohl et al., 2009). Three such studies then controlled for receipt of services after the baseline report (Casanueva et al., 2015; Dakil et al., 2011; Kahn & Schwalbe, 2010). Rather than split analyses according to initial substantiation, we chose to model variation in the likelihood of a second report based on whether a first report was followed by in-home or out of home child welfare intervention. The state in which the data were collected does not limit service provision by substantiation so substantiation was included as a control for the served and unserved groups. Given the substantial role of case management and assistance with obtaining resources for families that receive CPS services (Jonson-Reid et al., 2019), it was possible that this would diminish the role of baseline risks like caregiver poor health on recurrent maltreatment.

3.3.3. Question 3

Regional study: Following the logic of Slack et al. (2011), we were interested in early childhood as a period of particular vulnerability. Two studies of recurrence also focused on children under age 4 or 5 at the time of initial report (Jedwab et al., 2017; Palusci, 2011) although their follow-up period extended beyond early childhood. We chose to examine recurrence in early childhood by limiting the baseline first report to under age 4 (e.g., Jedwab et al., 2017) and the follow-up period to three years (to mimic the age range of Slack et al., 2011). The time variable was constructed in an identical fashion as listed for Question 2 with the sample split according to services being received or not after the initial report.

4. Results

4.1. Question One: Study one participants characteristics (Add Health)

Table 1 presents the case characteristics of the Add Health and Regional datasets. Of the total of 4,288 caregivers in Add Health, about 13.6% reported they were in a fair or poor physical health. Using medical billing records, nearly 2% of the Regional Study caregivers (n = 10,035) had diagnoses of serious or chronic physical health conditions. The rate was nearly twice as high in the group with reports compared to that without (not shown). The rate of poor caregiver health in the Slack et al. (2011) article was between 9.7 and 16.6%. Due to the demographics of the region and the sampling by low income, the Regional Study was primarily Black (78.3%) compared to Other (predominantly White). This is similar to the proportion of Black families in the Illinois AFDC sample analyzed by Slack et al. (2011). Add Health caregivers were more likely to be White (57.5%), which was consistent with the Fragile Families sample analyzed by Slack et al. (2011). The self-reported rates of maltreatment prior to 6th grade (generally under age 12) were higher for the Add Health Sample (about 46% neglect, 30% physical abuse and 8% sexual abuse) compared to the Regional Study (34%, 16%, and 4% respectively).

4.2. Question one

Table 2 presents models of the relationship between caregiver physical health and maltreatment occurrence (neglect/other/none) in the Add Health (top half of the table) and Regional data (bottom half). The Basic Model columns are restricted to variables common between studies while Extended Models include additional controls available. Using caregiver medical diagnoses, there was a stronger association with risk of a report of neglect compared to no reports in the Regional (O.R. = 1.59) compared to Add Health (O.R. = 1.36). The association persisted in the Extended Models. However, in the Regional Study, caregiver health did not predict type of maltreatment reported whereas in the Add Health data this was predictive of neglect compared to other forms of maltreatment (an increased likelihood of about 1.6 times). In the Add Health data youth self-report of poor health was associated with decreased risk of neglect compared to no maltreatment but the association was in the opposite direction for the Regional Study. Caregiver disability, record of mental health or substance abuse problem or history in foster care was predictive of a neglect report compared to none, but all but one of these relationships became non-significant when looking at maltreatment type. In the model of maltreatment type using the Regional Study, caregiver substance abuse or mental health problems predicted a decrease in likelihood of abuse compared to neglect (O.R. = 0.56). In the Add Health data, however, self-reported heavy drinking was associated with an increased risk of abuse.

4.3. Question two

Table three presents overall descriptive statistics as well as the results of the Cox Regression models of recurrence for those who received services after a first report (Model 1) compared to those who did not (Model 2). Not all variables included in the descriptive statistics column were significant in multivariate models. Compared to the overall sample (refer back to Regional Study, Table 1), caregiver and child risk indicators are more prevalent. About 32% of the sample received some form of child welfare service following their first investigated report (n = 1190, Table 3). The proportion of recurrent reports in the 16-year follow-up window was higher for those who were not served after a first report compared to those who were served (71.3 vs. 57.9%, Table 3).

Among those served, CG health status had no association with recurrence, but initial substantiation status and a first report of neglect had a small but positive association with recurrence. Baseline record of

Table 2
Multinomial Regression Model (Add Health) and Logistic Regression Model (Regional) on Maltreatment Outcomes.

Multinomial Regression Model	No maltreatment vs. Neglect				Neglect vs. Physical & Sexual Abuse			
	Basic Model		Extended Model		Basic Model		Extended Model	
	OR	SE	OR	SE	OR	SE	OR	SE
Black (ref: other)	0.99	0.08	1.02	0.08	0.80	0.15	0.84	0.15
Education	1.03	0.07	1.02	0.07	1.10	0.11	1.07	0.12
Kids' Health	0.75*	0.13	0.75*	0.13	0.91	0.22	0.91	0.22
Kids' Disability	1.08	0.47	1.11	0.48	1.53	0.67	1.05	0.79
Caregivers' Physical Health	1.36**	0.10	1.30*	0.10	1.65**	0.18	1.59*	0.18
Caregivers' Disability	1.10	0.13	1.15	0.13	1.36	0.20	1.43	0.21
Alcohol			0.84	0.18			1.62*	0.24
Unmet Health Needs			1.13	0.10			1.03	0.17
Poverty			0.88	0.09			0.88	0.15
Logistic Regression Model								
Black (ref: other)	0.72***	0.06	0.71***	0.07	0.71***	0.07	0.76***	0.08
Education	0.58***	0.05	0.60***	0.05	1.37***	0.06	1.33***	0.06
Kids' Health	1.40*	0.16	1.47*	0.17	0.79	0.24	0.77	0.24
Kids' Disability	1.66***	0.06	1.68***	0.05	1.13	0.07	1.12	0.07
Caregivers' Physical Health	1.59**	0.15	1.78***	0.15	1.08	0.20	1.02	0.20
Caregivers' Disability	2.59**	0.30	2.40**	0.30	1.09	0.31	1.14	0.31
Tract Median Income < 25 K			1.00	0.00			1.00	0.00
Caregivers with MH or SA			4.08***	0.10			0.56*	0.11
Caregivers' Foster Care Hx			2.40***	0.14			0.94	0.15
Child Age at AFDC receipt			0.98*	0.01			1.01	0.01

Note. *P < .05, **P < .01, ***P < .001.

CG mental health or substance abuse or receipt of family preservation compared to family centered services had moderate positive associations with recurrence (roughly 1.3 to 1.4 times higher). While there was no main effect for foster care, there was an interaction term with age indicating an increased likelihood associated with foster care of 1.09 times per increased year of age.

By comparison, among those not served following an initial report

(Model 2), an interaction between CG physical health and later time in risk period indicated double the risk of recurrence 16 or more months after the first report for those still at risk. Baseline neglect, substantiation, and a record of CG mental health and substance abuse problems remained predictive of a second report. Consistent with the idea of higher risk for younger children, there was a decreased risk of about 3% per year based on age at first report. Children whose

Table 3
Cox Regression Models (Regional Data) of Recurrence by Served After First Report.

Variables	Overall Descriptive	Model 1: Served any recur	Model 2: Unserved any recur
	N = 4956	N = 1190 ⁵ (recur = 57.9%)	N = 3764 (recur = 71.3%)
	%/μ	HR (CI)	HR (CI)
Child Age at 1st Report	2.2 yr	0.98(0.95–1.01)	0.97*(0.96–0.98)
Non-White	74.6%	0.91(0.73–1.13)	0.95(0.86–1.04)
Child chronic health	1.9%	–	–4
Child Dev. Problems	2.9%	–	–4
Child Other Disability	24.5%	1.16(0.97–1.38)	1.22*(1.11–1.34)
Caregiver (CG)/Family			
CG < 19 yrs at birth	19.7%	–	–
CG Chronic Health	2.4%	0.93(0.58–1.49)	1.07(0.74–1.54)
CG Education	61.1%	0.83*(0.71–0.97)	0.82*(0.77–0.89)
CG History Foster Care	4.8%	–	–
CG Cognitive Delay	1.4%	1.49(0.83–2.68)	1.57*(1.29–2.26)
CG MH or Sub. Abuse	10.6%	1.39*(1.09–1.76)	1.47*(1.29–1.68)
Family Conflict/Stress	4.1%	1.31(0.90–1.91)	2.09*(1.73–2.53)
Tract Median Inc < 25 K	67.9%	1.12(0.90–1.38)	1.19*(1.09–1.30)
First Report as Neglect	68.9%	1.21*(1.02–1.43)	1.27*(1.18–1.37)
Substantiated 1st report	23.2%	1.17 (0.99–1.38)	1.60*(1.42–1.79)
FCS ¹	20.4	1.00 (comparison)	–
FPS ²	6.6%	1.44*(1.23–1.69)	–
Foster Care (in/out)	4.5%	1.09 (0.81–1.46)	–
Interaction Terms			
Agecan*Foster	–	1.09*(1.03–1.15)	–
Health*Time ³	–	–	2.02*(133–3.06)
Final Model		Wald Chi-sq = 94.0, df = 14p < .0001	Wald Chi-sq = 352.89, df = 13p < .0001

Note. * p < .05.

⁴Child other disability and serious or chronic health had to be combined in Model 2 due to cell size.

¹ FCS stands for Family Centered Services.

² FPS stands for Family Preservation Services.

³ Model 2: health and time interaction over versus under 16 months.

⁵ Two cases had 0 values for time after controlling for time in foster care.

Table 4
Cox Regression Models (Regional Data) of Recurrence among Young Children by Served After First Report.

	Overall Descriptive N = 2420	Model 1: Served any recur N = 584 (recur 3yrs: 30.4%)	Model 2: Unserved any recur N = 1841 (recur 3yrs: 51.6%)
Variables		HR (CI)	HR (CI) if in final model
< 12 months at 1st Rept	29.8%	1.73*(1.20–2.48)	1.28*(1.11–1.47)
Non-White	74.7%	1.79 (0.79–4.08)	0.84*(0.72–0.97)
Child Dev. Problems	2.6%	1.93*(1.004–3.71)	1.48*(1.07–2.03)
Caregiver/Family			
CG Education	58.9%	0.66*(0.46–0.94)	0.81*(0.71–0.93)
CG < 19yrs at birth	18.9%	0.48*(0.26–0.86)	0.81*(0.69–0.95)
CG Cognitive Delay	2.6%	–	–
CG History Foster Care	7.3%	1.93*(1.15–3.25)	1.29*(1.04–1.59)
CG Chronic Health	2.1%	1.42(0.46–4.38)	2.68*(1.25–5.74)
CG MH or Sub. Abuse	9.6%	1.59*(1.05–2.41)	1.46*(1.19–1.80)
Family Conflict/Stress	4.5%	1.09(0.49–2.42)	2.01*(1.52–2.65)
Tract Median Inc < 25 K	68.2%	0.86(0.58–1.27)	1.25*(1.06–1.48)
First Report as Neglect	70.3%	3.04*(1.36–6.79)	1.59*(1.37–1.84)
Subst. Baseline Report	21.3%	1.26(0.92–1.74)	1.65*(1.37–1.98)
FCS ¹	19.6%	1.00 (comparison)	–
FPS ²	6.6%	1.38*(1.003–1.90)	–
Foster Care (in)	5.7%	1.46(0.93–2.29)	–
Interactions			
Infant*Foster		0.27*(0.12–0.57)	–
Non-white*Neglect		0.36*(0.15–0.84)	–
Neg*CG Health		–	0.35 (0.12–1.02)
Final Model Fit	Wald Chi-sq = 81.08, df = 16p < .0001		Wald Chi-sq = 204.8, df = 13p < .0001

Note. * p < .05.

¹ FCS stands for Family Centered Services.

² FPS stands for Family Preservation Services.

caregivers finished high school also had a lower risk of re-report. An indicator in the baseline report of family conflict was associated with greater than two times the risk (O.R. = 2.09).

4.4. Question three

Returning to the focus on young children, the Regional Study was restricted to those under age 4 at time of a first report (n = 2420). Table 4 provides descriptive statistics as well as results for Cox Regression of a second report within 3 years by whether cases were served or not at the baseline report. Not all variables included in the descriptive column were retained in the multivariate model. Once again, the recurrence rate was lower for those served after a first report compared to those not served (approximately 30% compared to over 51%). Also similar to the model including older children, caregiver health was only predictive of recurrence among families that received no child welfare services after the first report (Model 2; O.R. = 2.68). While infants were more at risk of recurrence than those age 1–3 at baseline, this effect was smaller among those cases not served. Families living in very low-income neighborhoods were more at risk among those not receiving services (O.R. = 1.25) but there was no relationship among those served. There were no differences in risk of recurrence by type of services received (Model 1) with the exception that among children who entered and exited foster care, infants had a lower risk of recurrence.

5. Discussion

Caregiver physical health as a risk for maltreatment has all but been ignored in the literature - despite reasons to believe it may impact parental capacity. Consistent with two prior studies (Conger et al., 1979; Schiller et al., 2012), maltreated groups were found to have worse self-report or official record of poor caregiver health. In contrast with Slack et al. (2011), the present study found that poor caregiver health was associated with neglect compared to no maltreatment using both self-report (Add Health) and official report (regional study) data sources in both poor and mixed income samples that were not restricted

to very young children. Given how little attention to maltreatment onset and caregiver health there has been, there are many possible reasons for the present findings. While hypothetically, caregiver health might impact care of a younger child more, there may be greater supports available for caregivers of very young children. For example, Slack et al. (2011) were able to control for supports like family members or other people that could offer financial assistance which was quite high across the three studies. Because of the age of the children in the Slack and colleagues' analyses, child self-report was not possible, making comparison to Add Health more difficult. Two of the three studies used in Slack et al. (2011) had access to CPS reports similar to the present Regional Study. However, these studies were surveys with greater risk of attrition and were limited to those families that had both parent 12-month reports and CPS reports. Further the follow-up period did not extend as far as in the present study.

Three of the five prior studies of maltreatment recurrence that included caregiver health (Casanueva et al., 2015; Dakil et al., 2011; Kahn & Schwalbe, 2010) did not limit analyses to substantiated cases. Both Palusci (2011) and Jedwab et al. (2017) examined children with first reports in early childhood but limited analyses to substantiated re-reports and neither were able to control for services. Similar to Kahn and Schwalbe (2010), we found an increased risk associated with caregiver health in our model, but only for those who received no services after the baseline report. It is not clear if Kahn and Schwalbe (2010) assessed potential interactions with services and caregiver health.

Hypothetically, intervening after a first report to CPS might result in attention to some of the baseline risks (Jonson-Reid et al., 2017). Consistent with this, we found a stronger signal for baseline risk in unserved compared to served cases. While we were unable to track referrals provided to other systems, we were able to assess whether a caseworker believed the family was following through on the case plan. The literature on recurrence and child welfare intervention is varied, including different data sources and analytic approaches, as well as policy variation in how cases are screened and served (Jonson-Reid et al., 2019). Further, data on accessing services following a referral are rarely collected. Future research should attempt to model the

relationship between how cases are processed and services clearly as well as attempt to measure follow-through on the case plan.

While the relationship of control and risk factors between models of recurrence overall and those restricted to younger children were generally similar, an exception of note was caregiver age at the child's birth. There was no difference in risk of recurrence by caregiver age overall, but having a young mother appeared protective among younger children. Most prior studies of recurrence that did control for caregiver age and health, have categorized age broadly (e.g., over 35 or under; Kahn and Schwalbe, 2010) or were limited to substantiated recurrence (Jedwab et al., 2017). At first glance, the present finding is counter intuitive, however there are potential explanations. First, once reported, a teenage mother may be more likely to access supports through family, school or home visiting programs. It was also not possible to control for family size and it may be that young mothers with only one child are less at risk of recurrence than older mothers with increased burden due to multiple children.

5.1. Strengths and limitations

While this article contributes to an understudied area in health and child maltreatment, there were several limitations. First, young adults who were interviewed between 18 and 26 years (wave three) in Add Health between 2001 and 2002 about their experiences of being maltreated when they were in grade six or earlier. Self-report of past maltreatment is potentially subject to a number of biases related to recall (Widom, 2019). On the other hand, parent self-report, case-worker report and official CPS reports may also be biased in varying ways. Increasing the triangulation of findings between maltreatment and caregiver health by using differing measurement approaches is needed. All in Add Health caregivers' report of their physical health was available in 1994–95 (wave one), but it is difficult to know if the caregiver's health preceded the self-reported abuse or neglect which would have technically occurred in the same time period. Nor was it possible to limit the analysis of Add Health to early childhood. On the other hand, by replicating analyses across differing data sets with different measurements, strengths and weaknesses we gain methodological triangulation (e.g., Slack et al., 2011).

Many studies have used some form of caregiver self-report of poor or good health. It is difficult to tease out what types of health conditions may be present or how this is associated with the perceived psychological burden or access to quality care. While the medical conditions chosen in the regional study are easier to categorize in regard to possible physical impairment, the fact they are present in billing records means that some kind of treatment was received. It is not possible to measure access to quality medical care which may also change based on national or regional policy. For example, both data sources collected health information prior to the implementation of the *Patient Protection and Affordable Care Act* (2010). Future studies should attempt to replicate findings using post-ACA samples and controlling for whether or not the region expanded care for adults as well as children.

Despite the limitations of the current study, there are some strengths worth mentioning. First, the use of two data sets with differing strengths and weaknesses to answer question one provides the opportunity to triangulate findings within our study and compare it to those used in Slack et al. (2011). Better understanding if caregiver health impacts recurrence as compared to occurrence addresses one of the primary aims of child protection - to protect children from harm. Very few studies of recurrence have controlled for caregiver health with none assessing how intervention may alter the relationships. On one hand, it makes sense that if caregiver health impacts the occurrence of maltreatment it might contribute to greater risk of ongoing problems. On the other hand, once reported it is possible that such issues may be mitigated by increased connections to services for the parent.

5.2. Implications

While promoting the health of children involved with CPS is an aspect of the well-being metric required by the federal Child Family Service Reviews (U.S. Department of Health & Human Services, 2014), no such emphasis exists for caregivers. Significant work exists documenting disparities in health associated with race and income (Krieger, Chen, Waterman, Rehkopf, & Subramanian, 2005; Woolf & Purnell, 2016), but it is not clear how such issues impact trajectories in other systems like CPS. Altman (2005) argued that addressing the pressing health needs of families involved with CPS is one of the keys to fostering positive outcomes, but such issues are rarely addressed by child protective services. There are increasing references to the multiple barriers to healthy functioning in families reported to CPS (e.g., Millett et al., 2016) and ongoing attention to the effects of context like material needs (e.g., Pelton, 2015). Yet, much of our approach has been focused on parenting services. While no one would suggest that parenting resources are ill-advised, it may be necessary to separately consider the health and well-being of the parent in order for such services to have their full effect.

Future work should attempt better understand how caregiver health is related to access and quality of care and its potential effects on first contact with CPS, ongoing reporting and ultimately outcomes like entry into foster care. Work is also needed to better understand if caregiver well-being is being adequately assessed when there are concerns about maltreatment and how such concerns are being addressed in case plans. With an increasing emphasis on medical homes and debate about health care reform, it is important that we understand how health care impacts cost across systems that serve vulnerable families.

CRediT authorship contribution statement

Chien-Jen Chiang: Conceptualization, Methodology, Formal analysis, Writing - original draft. **Melissa Jonson-Reid:** Funding acquisition, Conceptualization, Data curation, Methodology, Formal analysis, Writing - review & editing. **Brett Drake:** Funding acquisition, Software, Data curation, Writing - review & editing.

Declaration of Competing Interest

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.childyouth.2019.104671>.

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Further reading

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