The Within Poverty Differences in the Occurrence and Developmental Outcomes of Physical Neglect.

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ABSTRACT

MEGHAN E. SHANAHAN: The within poverty differences in the occurrence and developmental outcomes of physical neglect.
(Under the direction of Dr. Jonathan Kotch)

The purpose of this dissertation is to examine the within poverty differences in the risk factors for physical neglect, as well as isolate the impact of physical neglect on the developmental trajectories of impoverished children. A secondary data analysis of data from the Longitudinal Studies on Child Abuse and Neglect were used to address these goals. The first paper of this dissertation examined the within poverty differences in the occurrence of physical neglect. Logistic regression analyses revealed that poor children whose caregivers have depression are more likely to experience physical neglect than impoverished children whose caregivers do not have depression (p=.0072). Poor children whose caregivers have a history of physical and sexual abuse were more likely to experience physical neglect than poor children whose caregivers did not have a history of child abuse (p=.0096). Impoverished children living in lower quality neighborhoods were more likely to experience physical neglect than poor children who live in higher quality neighborhoods (p=.0464). The second paper of this dissertation examined the influence of physical neglect on the developmental trajectories of impoverished children. Three developmental outcomes were examined using Latent Curve Modeling: academic performance, internalizing behaviors, and externalizing behaviors. Impoverished children who were physically neglected had worse academic performance at age eight than poor children who did not experience physical neglect (p=.000). The academic performance of physically neglected children increased at a higher rate over time than the academic performance of children who were not physically neglected in this impoverished sample (p=0.054). Living in a higher quality neighborhood was academically protective for impoverished children, whether they experienced

physical neglect or not ($p<.05$). Physical neglect did not have an impact on the trajectories of internalizing or externalizing behaviors in this sample of poor children; however, other within poverty differences were identified. Poor children whose caregivers had depression were more likely to display internalizing ($p<.05$) and externalizing problems ($p<.01$) at age eight than poor children whose caregivers did not have depression. Policy and practice implications of the findings are discussed.

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Overview

Child maltreatment is a significant public health problem in America. Estimates place the number of children maltreated annually in the U.S. between 772,000[1] and 2.9 million.[2] The forms of child maltreatment included in that number are sub-divided into physical neglect, physical abuse, sexual abuse, emotional abuse, and medical neglect.[3] Neglect is the most common and accounts for the majority of the official reports.[1,2,4] It also results in more deaths each year than any other type of maltreatment.[4] Of all the types of neglect, physical neglect is the most frequent[2] and therefore will be the focus of this dissertation. Physical neglect is defined as the failure of a caregiver to provide adequate care or supervision for a child and meet his/her basic needs.[5] Numerous risk factors for neglect have been identified in the literature,[6,3,7-16] including poverty,[3,8,13,14-16] but not all studies have found a relationship between poverty and neglect,[17,18] and most children living in poverty are not neglected.[7] Prior studies have explored within poverty differences in experiencing neglect,[19-22] but these studies are fraught with methodological problems. Therefore, it is not apparent why some impoverished children are neglected and others are not. Both neglect and poverty have been linked to poor developmental outcomes,[23-34] but the isolated effect of neglect on the developmental trajectories of impoverished children is not known. The within poverty differences in the occurrence and developmental consequences of neglect are not clear. The ecological framework for maltreatment, an adaptation of Bronfenbrenner's ecological systems model,[35] may provide an avenue of insight into why some impoverished children are neglected, as well as help elucidate the role of neglect in their developmental outcomes over time.

According to the ecological framework for maltreatment, development occurs within a nested system that includes the individual, the family, the community, and society.[36] This model suggests that many factors, both proximal and distal to the child, lead to maltreatment.[36] Additionally, this framework allows one to consider factors at all levels of the model that influence a child's development,[37] including neglect.

The purpose of this dissertation is twofold. The first aim is to examine the within poverty differences in the occurrence of neglect. This will be addressed in the first paper of this dissertation. The second goal is to examine the developmental outcomes of children who experience neglect among a low-income sample, which will be addressed in the second paper. This dissertation utilizes the ecological framework for maltreatment, an adaptation of Bronfenbrenner's ecological systems model, to examine both distal and proximal factors that may predict neglect among low-income children, as well as the developmental impact of neglect on children living in poverty. This chapter serves as an introduction to both manuscripts and as such much of the literature reviewed here will also be discussed in the introduction of each of the papers that comprise this dissertation.

Child neglect is a national problem

According to the 2005-2006 National Incidence Study (NIS-4), the incidence of neglect was 16.2 per 1,000.[2] Close to 1.2 million children are physically neglected each year, accounting for forty-one percent of maltreated children.[2] By comparison, 6.5 per 1,000 children were physically abused, and 2.4 per 1,000 were sexually abused.[2] Other data support the significant numbers of children experiencing neglect. A 2002 anonymous telephone survey of mothers in North and South Carolina determined that, in a one month period, 14 per 1,000 children experienced physically neglectful behaviors.[38] It is important to note that since maltreatment often occurs in private, these numbers likely underestimate the true extent of the problem.[39]

Definition of child neglect

Neglect can be difficult to operationalize because it refers to acts of omission rather than commission on the part of caregivers, and numerous definitions of neglect are used in the literature.[39] That said, there are certain behaviors that all researchers consider neglectful,[39] including "inadequate nutrition, clothing, hygiene; inadequate medical, dental, or mental health care; unsafe environments; inadequate supervision, including inadequate caretakers (sic); abandonment, or expulsion from the home".[39] There are multiple subtypes of physical neglect, such as failure to provide and lack of supervision.[40,41] This dissertation will focus on physical neglect, which includes the failure to provide

appropriate food, clothing, shelter, supervision, and a safe environment for the child.[39] Failure to provide appropriate medical care is sometimes included in the definition of physical neglect;[39] however, this dissertation will not include medical neglect.

Child Poverty in the United States

In 2008, 13.2 percent of the US population , or 39.8 million people, were living in poverty.[42] This poverty rate was the highest since 1997.[42] Ten percent of families live in poverty.[42] Persons under the age of eighteen account for more individuals in poverty than any other age group and are disproportionately represented among the poor. While children accounted for 24. 6 percent of the population in 2008, 35.3 percent of those living in poverty were under eighteen years of age.[42] Even though the US is one of the wealthiest nations in the world, the child poverty rate is higher than many European countries.[43,44]

Growing up in poverty is associated with many negative outcomes. Mortality rates among children living in poverty are higher than rates among children who are not impoverished.[45] Children whose families are impoverished are five times as likely to be in poor or fair health as children whose families are not living in poverty.[46] Interestingly, children in near poor families are more likely to have unmet medical needs, delayed medical care, and be uninsured than children who live in poverty and those who are not impoverished.[46] This is likely due to the fact that children who live near poverty are not eligible for many of the programs aimed at helping children in poverty, such as TANF or Medicaid.[47] Growing up in poverty has a negative impact on more than just the physical health of children. Education is often cited as a means to rise above the circumstances one was born into, but children who live in poverty are more likely to attend poor schools than non-poor children, and often receive a less than optimal education.[44] Children living in poverty are less likely to graduate from high school than non-poor children, as well as attain additional education or training beyond high school.[44] There is a high economic cost associated with child poverty as well. It has been estimated that the costs associated with child poverty are at least $500 billion a year.[48]

Adaptation of Bronfenbrenner's ecological systems model

Bronfenbrenner's ecological systems model posits that development occurs within the context of nested, interconnected systems.[35] The first level within this system is called the microsystem, which refers to the immediate setting of the developing person.[35] The next level is the mesosytem which contains the setting in which the developing person participates, followed by the exosystem which contains surroundings in which the developing person does not engage, yet is affected by.[35] The final level is the macrosystem, which refers to the culture in which the other levels are embedded.[35] According to Bronfenbrenner, a person's development is affected by all levels of this system, as well as by the relationships between the levels.[35] Jay Belsky adapted the ecological systems model into the ecological framework for child maltreatment in order to examine abuse and neglect.[36,49] While the basic principle of considering the context in which a person develops is maintained, the levels are slightly different (i.e., individual level, family level, community level, and societal level).[36] These levels all have the same meaning in this framework as they did in Bronfenbrenner's model. Given that this model suggests that development occurs within the context of various settings, both immediate and distal to the individual, it is useful in examining both the occurrence of neglect and its consequences. While the ecological framework for child maltreatment is often used to examine the etiology of child maltreatment,[18,50] Bronfenbrenner's model has been used to examine the effect of poverty on child development.[37] Therefore, it is appropriate to apply the ecological framework of child maltreatment to both aims of this dissertation.

Etiology of child neglect

Numerous risk factors and one protective factor for neglect have been identified in the literature. Much of the literature regarding neglect examines both abuse and neglect without drawing a distinction between the two;[51] however, the focus of this dissertation is solely on neglect and therefore only studies that have distinguished neglect from abuse will be reviewed, unless otherwise noted.

Only one individual level characteristic has been associated with experiencing neglect. Boys are at an increased risk of experiencing neglect when compared to girls.[52] Numerous parental and family level characteristics have been found to predict neglect. However, findings regarding these associations have not been consistent.[7] Children who live with several siblings or other children are at a greater risk of experiencing neglect than children who don't live with several other children.[6,7] Specifically, children who live with four or more children were physically neglected at almost three times the rate of children who don't live with siblings or other children.[6] Children who live with a single parent are also more likely to experience neglect than children who live with both parents.[6] Children born to young mothers are more likely to experience neglect than children born to older mothers.[9] Additionally, parents who experienced physical[10,53,54] or sexual abuse[10,53] as children are more likely to maltreat their children than parents who were not maltreated in their childhood.[10] While these studies did not distinguish abuse from physical neglect, given the evidence of the intergenerational transmission of child maltreatment, it is important to consider caregiver history of abuse when discussing risk factors for physical neglect. Parents with mental health disorders are more likely to neglect their children than parents who do not have mental health problems.[7,11,12] Finally, families who live in poverty are more likely to neglect their children than families who are not impoverished.[6,8,13,14]

Community characteristics have also been found to be associated with neglect. Rates of unemployment in neighborhoods have been found to be positively associated with rates of neglect.[15] Specifically, it was determined that male unemployment rates accounted for two-thirds of the variance in neglect rates between neighborhoods.[15] Neighborhood poverty levels have also been associated with rates of neglect.[16] In fact, it has been suggested that neighborhood poverty is more strongly associated with neglect than other forms of child maltreatment.[16] It is possible that the relationship between neighborhood poverty and neglect is indirect;[16] there may be factors associated with a family living in poverty that are also related to a child experiencing physical neglect, such as depression. It is possible that living in an area with high male unemployment rates could lead to depression, or that mothers with depression may have difficulty maintaining employment and therefore can only afford to live in low-income areas. Not all studies that have examined the relationship between neighborhood poverty and neglect have found a strong relationship.[15] The society level of the ecological framework

for child maltreatment will not be considered in this dissertation because the dataset that will be used does not include indicators at this level.

The literature suggests that social support may be a protective factor against neglect.[18,21,22] In a prospective study of neglect, pregnant women who reported low levels of social support were more likely to be reported to CPS for neglect by the time their children were four years of age than women who did not report low levels of social support while pregnant.[22] One study determined that the effect of life stressors on maltreatment reports is mitigated by levels of social support.[18] Mothers who are neglectful receive fewer resources from both their mothers and partners than women who have not maltreated their children.[21] Mothers who have been reported to CPS for neglect report less emotional support from their own mothers than those who have not maltreated their children. However, these mothers report the same level of emotional support from their partners as women who have not maltreated their children.[21] The protective effects of emotional social support may vary depending on who is providing the support.

Within poverty differences in the occurrence of neglect not clear

The only potential risk factor that occurs at both the family and community level of the ecological framework is poverty. While the relationship between poverty and neglect seems logical, particularly since limited financial resources can hinder a caregiver's ability to meet the needs of his/her children,[7] it is important to note that most impoverished parents do not neglect their children.[7] Furthermore, it is not clear why some children in poverty are neglected and others are not. It is possible that it is the other risk factors for neglect, which tend to cluster among impoverished individuals,[7] that lead to the occurrence of child neglect among those who are impoverished. Perhaps more interesting is that there may be protective factors, such as social support, that explain why most children in this at-risk group are not neglected. It is possible that social support among those living in poverty may facilitate sharing of resources, which may in turn alleviate the potential for neglect created by the presence of the risk factors previously mentioned.

While some of the studies discussed above have utilized samples that are predominantly impoverished, [6,8] a few studies have explicitly investigated within poverty differences in experiencing

neglect by only including those living in poverty in the sample.[19-22] Three of these studies examined the role of social support in the occurrence of neglect.[19,21,22] However, only two found social support to be a significant protective factor.[21,22] Two studies only examined one risk factor for neglect.[20,21] Additionally, one study's only measure of poverty was that the participants utilized a clinic for impoverished individuals.[212] Finally, and perhaps most importantly, all of these studies used CPS reports to determine whether or not the children had been neglected.[19-22] Children who are reported to CPS for child maltreatment represent only a small portion of children who are actually maltreated,[6] and reporting biases regarding which families become know to CPS[6] may distort our understanding of risk and protective factors; studies using CPS records to classify a child's neglect status are actually examining the risk factors for being reported for neglect, rather than the risk factors for experiencing neglect. Furthermore, CPS agencies vary in what behaviors and situations are substantiated as neglect.[55] It is less likely that that a parent will be criminally prosecuted for a substantiated case of neglect than for a physical or sexual abuse substantiation.[56] Therefore, an abuse allegation may be substantiated as neglect in order to avoid a criminal charge while still ensuring that the family will receive social service intervention.[56] Consequently, not everything that is substantiated as neglect in CPS reports is clearly neglect, due to these other considerations.

Child outcomes associated with neglect

Neglect has a negative impact on child development.[23-30] Specifically, neglect has been shown to affect aspects of biological, emotional, cognitive, and behavioral development.[23-30] Some evidence suggests that neglect has a worse effect on developmental outcomes than other forms of maltreatment.[23,24] However it is important to note that not all studies support this finding.[25] These differences may be because all three studies examining this issue utilized convenience samples and used different measures of development.[23-25]

In a study of the effects of child abuse and neglect on brain development, neglect was associated with a thirteen percent reduction in total corpus callosum area.[23] Furthermore, neglect was found to be a more significant contributor to a reduction in corpus callosum size than physical abuse, sexual abuse, or Post Traumatic Stress Disorder.[23] Children who have been neglected demonstrate

difficulty recognizing and distinguishing emotions based on facial expressions when compared to physically abused and control children.[24] Neglect has also been found to be associated with cognitive deficits[24] and poor academic achievement.[27] Specifically, children who were neglected, as well as children who were abused, were found to have lower scores on measures of receptive language and IQ than non-maltreated children.[25] Additionally, a study comparing the school readiness of children from middle class families, children from families who receive Aid to Families with Dependent Children (AFDC), and children who had been maltreated (the majority neglected) determined that maltreated children were less ready to learn than the other two groups of children.[26] It has also been determined that neglected children received lower grades in Math and English than non-maltreated children across kindergarten to twelfth grade.[27] It is important to note, however, that not all studies have found an association between neglect and poor cognitive outcomes.[30] This may be due to how neglect was defined in these studies. The two studies that found a relationship between neglect and poor cognitive outcomes used CPS reports to determine a child's neglect status;[25,26] the study that did not find a relationship used multiple sources, including interviewer assessment of the home environment, observations of parent-child interactions, and maternal report, to determine neglect status.[30] Children who have been neglected have more behavior problems than children who have not been neglected.[25,28-30] Specifically, neglected children have been reported to engage in fewer social interactions[25] and be more aggressive[29] than children who were not neglected. Interestingly, one study determined that early neglect was more predictive of later aggression than early abuse, later abuse, or later neglect,[28] indicating that the developmental timing of neglect plays an important role in the experience of negative developmental outcomes. Additionally, cumulative neglect has been found to be positively associated with internalizing behavior problems.[30]

Poverty and developmental outcomes

As previously mentioned, poverty has a negative impact on children. It has been found to be associated with poor developmental outcomes,[31-34] specifically, cognitive development,[31,32,34] school engagement,[33] and behavior problems.[34] One study determined that children living in poverty score lower on measures of verbal memory, vocabulary, as well as math and reading than non-poor

children, even when controlling for maternal education and family structure.[31] Another study determined that children who live below the poverty line score lower on a measure of development and cognition than children whose families live at three times the poverty level, when controlling for maternal depression, race, marital status, and maternal age.[32] Using instrumental variable analysis, Morris and Gennetian found that income level predicted school engagement with lower income associated with less school engagement.[33] A study conducted by the NICHD found that poverty predicted both cognitive abilities and problem behaviors, with children living in chronic poverty scoring worse than children who had experienced transient poverty or never lived in poverty.[34]

Given that neglect occurs more frequently in low income families than higher income families[2], it is difficult to disentangle the effects of neglect from living in poverty on child outcomes. It has been suggested that the quality of the home environment, as well as maternal sensitivity, may mediate the relationship between poverty and cognitive development.[34] However this relationship has not been found for all developmental outcomes.[57] Additionally, no studies have examined the relationship among poverty, neglect, and developmental outcomes specifically; all have used measures of poor parenting,[34,57] but not necessarily neglect. When considering the impact of neglect on the development of children over time, it is important to consider the effects of living in poverty.

The effect of neglect on the developmental trajectories of children

While numerous studies have examined the impact of neglect on developmental outcomes, only one study utilized longitudinal methods to explore the effect of neglect on development, specifically aggressive behavior.[28] However, in addition to only examining one developmental outcome, this study used CPS records to identify the maltreatment status of the sample and does not include non-maltreated children,[28] thereby limiting comparisons to a non-maltreated population. Therefore, it is not clear what effect neglect has on the development of impoverished children over time.

Significance and summary

Neglect is the most common form of child maltreatment[1,2,4] and poverty is often cited as a risk factor for its occurrence.[6,8,13-16] However, it is not clear why some children in poverty are neglected and others are not. The first paper of this dissertation investigates the within poverty differences in experiencing neglect by examining the risk factors for being neglected among a sample of impoverished children. Two sources (CPS records and self report) will be used to classify a child's neglect status, thereby assuring that the analysis will examine the risk and protective factor(s) for experiencing neglect and not solely the risk factors for being reported to CPS for neglect. Additionally, the first paper of this dissertation examines risk factors at the individual, family, and community levels of the ecological framework, therefore taking into consideration the complex context in which neglect may occur. Social support at both the individual and neighborhood level was considered as a protective factor.

Neglect has been found to be associated with poor developmental outcomes,[23-30] yet little is known about its impact on the development of children over time. Further complicating this issue is the fact that poverty is both associated with the occurrence of neglect[3] and poor developmental outcomes.[31-34,57] Therefore, given the confounding nature of poverty, it is difficult to isolate the role of neglect on child development among children living in poverty. The second paper of this dissertation examines the within poverty differences of the effects of neglect on child development, specifically, by assessing the effect of neglect on the developmental trajectories of impoverished children. This was accomplished by comparing the developmental trajectories of children who are impoverished and neglected to children who live in poverty but did not experience maltreatment. Additionally, other influences on development at the individual, family, and community level were controlled for in the analyses.

The findings of this dissertation may serve to inform research, practice, and policy. This dissertation incorporates two measures of physical neglect into a composite variable, thereby addressing the weakness in previous studies of only relying on CPS reports as an indicator of neglect. Understanding what characteristics increase the risk of an impoverished child experiencing physical neglect will help better identify children who are at risk of experiencing physical neglect, so

that they can be targeted with prevention efforts designed to reduce that specific risk factor. Conversely, if protective factors are identified, programs or policies can be developed to increase these factors among impoverished families. Determining if neglect has a negative impact on the developmental outcomes of children will also inform programs and policies. If physical neglect has a negative effect on the developmental outcomes of children, above and beyond that impact of poverty, this would provide support to increase funding for programs to prevent physical neglect. The results of this dissertation could also help to inform educators about factors that may affect an impoverished child's behavior and performance in school.

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INTRODUCTION

Child maltreatment is a significant public health problem in America. Estimates place the number of children maltreated annually in the U.S. between 772,000[1] and 2.9 million.[2] The forms of child maltreatment included in that number are sub-divided into physical neglect, physical abuse, sexual abuse, emotional abuse, and medical neglect.[1] According to the 2005-2006 National Incidence Study (NIS-4) 4.0% of children experience child maltreatment each year.[2] Neglect is the most common and accounts for the majority of the official reports.[1-3] It also results in more deaths each year than any other type of maltreatment.[3] According to the NIS-4, neglect accounted for sixty-one percent of maltreated children.[2] Furthermore, 6.5 per 1,000 children are physically abused, 2.4 per 1,000 are sexually abused, and 16.2 per 1,000 are physically neglected each year.[2] Other data support the significant numbers of children experiencing neglect; a 2002 anonymous telephone survey of mothers in North and South Carolina determine that in a one month period, 14 per 1,000 children experience physically neglectful behaviors.[4] It is important to note that since maltreatment often occurs in private, these numbers likely underestimate the true extent of the problem.[5] Of all the types of neglect, physical neglect is the most frequent[3] and therefore will be the focus of the current study.

Neglect can be difficult to operationalize because it refers to acts of omission rather than commission on the part of caregivers.[6] It is often defined as the failure of a caregiver to provide adequate care or supervision for a child or to meet his or her basic needs.[7] Numerous definitions of neglect exist in the literature;[4] however there are certain behaviors that all researchers consider neglectful,[4] including “inadequate nutrition, clothing, hygiene; inadequate medical, dental, or mental health care; unsafe environments; inadequate supervision, including inadequate caretakers (sic); abandonment, or expulsion from the home”.[4] Furthermore, there are multiple subtypes of physical neglect, such as failure to provide and lack of supervision.[6,8] The current study will focus on physical neglect, which includes the failure to provide appropriate food, clothing, shelter, supervision, and a

safe environment for the child.[5] Failure to provide appropriate medical care is sometimes included in the definition of physical neglect;[4] however, this study will not include medical neglect.

Bronfenbrenner's ecological systems model posits that development occurs within the context of nested, interconnected systems.[9] The four levels of this model refer to the immediate setting of the developing person, the setting in which the developing person participates, surroundings that affect the person, but with which he/she does not engage, and finally the culture in which the other levels are embedded.[9] According to Bronfenbrenner, a person's development is affected by all levels of this system, as well as by the relationships between the levels.[9] Jay Belsky adapted Bronfenbrenner's model into the ecological framework for child maltreatment which has the following levels: individual, family, community, and societal.[10,11] The basic principle of considering the context in which a person develops is maintained in this framework and the levels have the same meaning as they did in Bronfenbrenner's model.[10] Given that this model suggests that development occurs within the context of various settings, both immediate and distal to the individual, it is useful in examining the occurrence of neglect. The ecological framework is the most frequently cited explanatory model for the etiology of child maltreatment;[12,13] therefore, it is appropriate to apply the ecological framework of to the current study.

Numerous risk factors and one protective factor for neglect have been identified in the literature. However, much of the literature regarding neglect examines both abuse and neglect, without drawing a distinction between the two.[14] The focus of this study is solely on neglect therefore, only studies that have distinguished neglect from abuse will be reviewed, unless otherwise noted.

Only one individual or child characteristic has been associated with experiencing neglect. Boys are at an increased risk of experiencing neglect when compared to girls.[15] Numerous familial characteristics predict neglect. However, findings regarding some of these associations have not been consistent.[16] Children who live with several siblings or other children are at a greater risk of experiencing neglect than children who don't live with several other children.[17,18] Specifically, children who live with four or more children were physically neglected at almost three times the rate of children who don't live with siblings.[17] Children who live with a single parent are also more likely to experience neglect than children who live with both parents.[17] Children born to young mothers are more likely to

experience neglect than children born to older mothers.[16] This appears contradictory to the risk factor of living with four or more siblings, as it not likely that a younger mother would have four or more children. Given this, it is important to mention that the relation between the number of children in the family and physical neglect did not consider other potential risk factors and was therefore considered separate from maternal age. Additionally, parents who experienced neglect,[16] sexual abuse,[19] or physical abuse[19,20] as children are more likely to maltreat their children than parents who were not maltreated in their childhood. While these studies did not distinguish abuse from physical neglect, given the evidence of the intergenerational transmission of child maltreatment, it is important to consider caregiver history of abuse when discussing risk factors for physical neglect. Parents with mental health disorders, including depression,[21,22] are more likely to neglect their children than parents who do not have mental health problems.[18,21,22] Finally, families who live in poverty are more likely to neglect their children than families who are not impoverished.[17,15,23-25]

Community characteristics are associated with neglect. Rates of unemployment in neighborhoods are positively associated with rates of neglect.[26] Specifically, it was determined that male unemployment rates were associated with two-thirds of the variance in neglect rates between neighborhoods.[26] Neighborhood poverty levels have also been associated with rates of neglect.[26] In fact, it has been suggested that neighborhood poverty is more strongly associated with neglect than other forms of child maltreatment.[27] It is possible that the relationship between neighborhood poverty and neglect is indirect;[27] there may be factors associated with a family living in poverty that are also related to a child experiencing physical neglect, such as depression. However, not all studies that have examined the relationship between neighborhood poverty and neglect have found a strong relationship.[26]

The literature suggests that social support may serve as a protective factor against neglect.[12,28,29] In a prospective study of neglect, pregnant women who reported low levels of social support were more likely to be reported to CPS for neglect by the time their children were four years of age than women who did not report low levels of social support while pregnant.[29] Additionally, one study determined that the effect of life stressors on maltreatment reports is mitigated by higher levels of social support.[12] Mothers who are neglectful receive fewer resources from both their mothers and

partners than women who have not maltreated their children.[28] Mothers who have been reported to CPS for neglect report less emotional support from their own mothers than those who have not maltreated their children. However, these mothers report the same level of emotional support from their partners as women who have not maltreated their children.[28] The protective effects of emotional social support may vary depending on who is providing the support.

The only potential risk factor that occurs at both the family and community level of the ecological framework is poverty. While a relationship between poverty and neglect seems logical, particularly since limited financial resources can hinder a caregiver's ability to meet the needs of his/her children,[12] most impoverished parents do not neglect their children.[18] It is not clear why some children in poverty are neglected and others are not. It is possible that other risk factors for neglect, which tend to cluster among impoverished individuals,[18] lead to the occurrence of child neglect among those who are impoverished. Perhaps more interesting is that there may be protective factors, such as social support, that explain why most children in this at-risk group are not neglected. It is possible that social support, either instrumental or emotional, among those living in poverty may facilitate sharing of resources, which may in turn alleviate the potential for neglect created by the presence of the risk factors previously mentioned.

While some of the studies discussed above have utilized samples that are predominantly impoverished, [17,23] a few studies have explicitly investigated within poverty differences in experiencing neglect by only including those living in poverty in the sample.[28-31] Three of these studies examined the role of social support in the occurrence of neglect.[28-30] However, only two found social support to be a significant protective factor.[28,29] Two studies only examined one risk factor for neglect.[29,31] Additionally, one study's only measure of poverty was that the participants utilized a clinic for impoverished individuals.[29] Finally, and perhaps most importantly, all of these studies used CPS reports to determine whether or not the children had been neglected.[28-31] Children who are reported to CPS for child maltreatment represent only a small portion of children who are actually maltreated[17]and reporting biases regarding which families become known to CPS may distort our understanding of risk and protective factors;[17] studies using CPS records to classify a child's neglect status are actually examining the risk factors for being reported for neglect, rather than the risk factors

for experiencing neglect. Furthermore, CPS agencies vary in what behaviors and situations are substantiated as neglect.[32] It is less likely that that a parent will be criminally prosecuted for a substantiated case of neglect than for a physical or sexual abuse substantiation.[33] Therefore, an abuse allegation may be substantiated as neglect in order to avoid a criminal charge while still ensuring that the family will receive social service intervention.[33] Consequently, not everything that is substantiated as neglect in CPS reports is clearly neglect. This study will address this issue through two avenues. The first is that the CPS reports in the dataset have been recoded to ensure that the behavior(s) the child experienced are actually physical neglect. The second is that two measures of neglect (CPS reports and self report) were utilized to form a composite neglect variable.

Neglect is the most common form of child maltreatment,[1-3] and poverty is often cited as a risk factor for its occurrence.[17,22-27] However, it is not clear why some children in poverty are neglected and others are not. The current study examines within poverty differences in child neglect by examining the risk factors for being neglected among a sample of impoverished children. Two sources (CPS records and self report) will be used to classify a child's neglect status, therefore assuring that the analysis will examine the risk and protective factor(s) for experiencing neglect, and not solely risk factors for being reported to CPS for neglect. The current study will utilize the ecological framework for child maltreatment to examine risk factors at the individual, family, and community levels of the ecological framework, taking into consideration the complex situations that may lead to the perpetration of neglect among this at-risk group. Social support at both the individual and neighborhood level will be considered as a protective factor. While other studies have examined risk factors for experiencing neglect, this is one of the first studies to use two indicators of neglect status (CPS report and self report). The following hypothesis will be tested:

> Children who live in or near poverty, as determined by their income-to-needs ratio, who meet all or some of the following profile will be more at risk of experiencing physical neglect than children who live in or near poverty but who don't meet all or some of the following profile: male, number of siblings, young maternal age at birth of the target child, caregiver history of neglect, caregiver depression, and living in a lower quality neighborhood. Conversely, social

support will reduce the likelihood of neglect by moderating the relationship between each of the hypothesized risk factors and physical neglect.

METHODS

A secondary data analysis of a subset of the Longitudinal Studies in Child Abuse and Neglect (LONGSCAN) dataset will be used to test the hypothesis this study. LONGSCAN is a national consortium of longitudinal studies of child maltreatment.[34] Five sites contribute data to LONGSCAN,[34] three of which were used for the current study: Southern, Midwestern, and Eastern. The five sites each have their own goals and study aims. However given their use of similar data, collection schedules and common measures, the data from these sites can be combined for analyses.[34] Data from the Southern, the Midwestern, and the Eastern sites include children who are at-risk for being maltreated, children who were maltreated, and controls. Therefore, the dataset for the current study contains both children who were physically neglected and children who did not experience any form of maltreatment. If a child did not experience physical neglect, but did have a report of maltreatment according to CPS records, he/she was excluded from the current sample. This ensured that children included in the non-neglected group were not known to CPS for any report of maltreatment. 26 children were excluded based on this criterion. It was not possible to determine if the children in the non-neglected had a self-report of another form of maltreatment. Children who experienced physical neglect in this sample may also have experienced physical, sexual, or emotional abuse. Data from when the children were younger than 4 years of age, 4, 6, 8, and 12 years of age were included in the analyses. This secondary data analysis received approval from the Public Health-Nursing Institutional Review Board at the University of North Carolina at Chapel Hill.

Variables

LONGSCAN has given careful attention to measurement. A large portion of the maltreatment records have been obtained from social service agencies; the resulting information has been examined and recoded along research classifications that address the measurement problems of prior studies using official records. The following variables were used in the current analysis:

Neglect: A physical neglect variable was constructed from a systematic review of CPS records and from About My Parents (a youth self report measure of neglect). The process of coding maltreatment records for LONGSCAN has been described previously.[33] Only physical neglect that occurred before the age of eight years of age was included in the current analyses. Given that neglect occurs more frequently among younger children,[2,18] this accounts for most cases of neglect. Both unsubstantiated and substantiated reports of physical neglect, according to CPS records, were included in the LONGSCAN neglect variable. Unsubstantiated reports were included in addition to substantiated reports because analyses have demonstrated that outcomes for children do not differ when comparing substantiated cases to unsubstantiated cases of maltreatment.[35] The CPS reports variable was coded dichotomously (yes/no).

An indication of physical neglect by a child on six items from the *About My Parents* [36] instrument at the age twelve data collection point were used to determine neglect status for this instrument. These six items ask the child to retrospectively report on their experiences in elementary school. A correlation matrix was run for these six items and two separate variables emerged: *Supervisory Neglect* and *Failure to Provide* (Table 2-1). Two items comprised the *Supervisory Neglect* variable and four items comprised the *Failure to Provide* variable. These data were also coded dichotomously (yes/no). If a child endorsed either “Sometimes” or “A lot” for an item, that item was coded as “yes”. Positively phrase items were reverse coded (i.e., I was given enough to eat). If any of the items were coded as “yes” then the child was coded as experiencing physical neglect.

Given the biases inherent in each source, it is important to use multiple measures to comprise the physical neglect variable in order to ensure as complete a measure of neglect as possible. Therefore, two sources of neglect data were used to comprise the physical neglect variable used as the outcome for this study. If either the CPS reports variable, the self-report of supervisory neglect variable, or the failure to provide variable were endorsed (=1), then the neglect variable was coded as 1. If none of the three physical neglect variables were endorsed, then the neglect variable was coded as 0. There was some correspondence between CPS reports and self-report of physical neglect. 45 children were identified by both CPS and self-report as have experienced physical

neglect; 70 children were identified by CPS report as being physically neglected, but not self-report; 112 children were identified by self-report and not by CPS; and 90 children had CPS reports of physical neglect, but were missing self-report data. The distribution of risk factors for neglect did not differ greatly between these groups. The only differences were regarding caregiver's history of maltreatment and the number of children living in the home. The caregivers of children who were known to CPS only were more likely to have a history of physical or sexually abuse than children who were identified by self-report only. The same was true for children who were known to CPS and were missing self-report data. Children who only had a CPS report lived with more children than children who were identified by self-report only. The same was true for children who were identified by CPS reports and self-report and children who were known to CPS and were missing self-report data.

Poverty: An income-to-needs ratio was constructed in order to measure poverty. Family income is collected from LONGSCAN participants as part of a project developed measure, and it was divided by the appropriate U.S poverty income guideline for that particular family size and the year of data collection in order to calculate the income-to-needs ratio. The income information, as well as family size information, collected at the first data collection time point was used to generate the income-to-needs ratio. In LONGSCAN, income is collected as a categorical variable. Given this, the mid-point of each income bracket was used as the income variable in the income-to-needs ratio. The income-to-needs ratio was included in the analysis as a continuous variable. This included children who live in poverty, as well as those who are near poverty. Therefore, the children included in the analysis had an income-to-needs ratio that was equal to or less than 1.99.

Child's gender: Information regarding the gender of the child was taken from demographic data collected as part of a project-developed measure. These data are categorical with male coded as 1 and female coded as 2.

Child's race: Information regarding the race of the child was taken from demographic data collected as part of a project developed measure at baseline. These data are categorical with White coded as

1, Black coded as 2, Hispanic coded as 3, Native American coded as 4, Multi-Racial coded as 5, and Other coded as 6. These data were not included in regression analyses, but were used to describe the sample.

Respondent's relationship to child: Information regarding the relationship of the respondent to the child was obtained from the Caregiver Interview. These data are categorical with biological mother coded as 1, adoptive mother coded as 2, grandmother coded as 3, stepmother coded as 4, other female relative coded as 5, foster mother coded as 6, other female coded as 7, biological father coded as 8, and other coded as 14. Data collected at the 0-4 interviews were used for the current study. These data were not included in the regression analysis, but were used to describe the sample.

Mother's age at birth of target child: This information is gathered as part of a project-developed demographics measure that is administered to mothers. Data from the first wave of data collection was used in the proposed analyses. This variable was included in the analysis as a continuous variable.

Caregiver history of physical/sexual abuse: This information is gathered as part of a project-developed measure of the caregiver's history of loss and victimization. Data collected at the first wave of data were used in the proposed analyses. Eight items were used to create this variable. Two of the items captured experiencing physical abuse and the other six measured sexual abuse. This variable was coded dichotomously (yes/no). If any of the eight items were endorsed, the maternal history of maltreatment variable was coded as "yes".

Caregiver mental health: The Center for Epidemiological Studies-Depression Scale[37] (CES-D) is used to measure caregiver depression in LONGSCAN. This is a widely used measure of depression.[38,39] Scores greater than or equal to sixteen indicate depression.[40] Data collected at the second wave (age four) of data collection were used in the current analyses. This variable was coded dichotomously

(yes/no). If a caregiver scored 16 or higher on the CES-D she was coded as having experienced depression.

Number of other children in the home/siblings: A project-developed measure of family/household composition collects these data in LONGSCAN. Data collected at the assessment at age four were used in the proposed analyses. The number of children in the household was included in the analysis as a continuous variable.

Single parent: A project-developed measure of family/household composition collects these data. Data collected at the assessment at age four were used in the proposed analyses. This variable measured if the respondent was living in a spouse-like relationship. Given that multiple categories were used to measure this variable, three dummy variables were created: No adult mate, living with a wife/husband, and living with a male or female partner.

Neighborhood quality: A project-developed measure of neighborhood characteristics, the Neighborhood Short Form, generates these data. Data collected at the first wave of data collection were used in the proposed analyses. Four items from this measure that indicate the quality of the neighborhood were used to create this variable. An average of the four items was because it was not hypothesized that one of the items would be a stronger indication of neighborhood quality than any of the others. This variable ranges from 1 (very much like my neighborhood) to 4 (not at all like my neighborhood). The four items included in this variable are: Most people in this neighborhood are on welfare; It's dangerous in this neighborhood; The buildings and yards in this neighborhood are really run down; and There are people in this neighborhood who might be a bad influence on my child(ren). High scores on this measure of neighborhood quality indicate higher quality. This variable was used as an indicator of neighborhood poverty.

Social support: Given that there are many types of social support, three measures were used to assess it in the current study. Each measure assesses a different type of social support and therefore

the three measures were considered separately in analyses. For all three measures, data collected at the first or second wave of data collection were used in the current analysis.

The first measure is a modification of the Duke-UNC Functional Social Support Questionnaire (FSSQ). This form measures an individual's perceived social support.[41] This modified version contains three scales: Confidant Support, Affective Support, and Instrumental Support.[41] The total score on the FSSQ, which could range from 10 to 50, was used in the analysis.

The current study also used the Family APGAR scale[42] to assess social support. This measure assesses social support within the family by asking individuals to report their satisfaction with family relationships.[41] The total score for the Family APGAR scale was used for the current analysis. The potential scores range from 5 to 15.

Finally, neighborhood social support was measured using the Support scale from a project developed measure of neighborhood characteristics. There were 25 items on this questionnaire that measure neighborhood support. Each variable had a range of 1 to 5. An average of these 25 variables was used to create the neighborhood support variable.

Site: Dummy variables were created for each of the LONGSCAN sites included in the current analysis, with the Southern site as the referent category.

ANALYSIS

A secondary data analysis of the LONGSCAN project was used to address the aims of the current study. In order to be included in the current analysis, children must live with families that are poor or near poor (income-to-needs ratio below 2.0). Children who were included in the neglected group must have experienced physical neglect by the age of eight. Children in the non-maltreated group must not have experienced any form of maltreatment before the age of eight.

Logistic regression analysis was conducted with physical neglect as the dependent variable. The following factors were analyzed: gender, number of children in the home, maternal age at birth of the target child, caregiver history of neglect, caregiver depression, income-to-needs ratio, neighborhood quality, and the three measures of social support. The following variables were

included as continuous variables: number of children in the home, maternal age at birth of the target child, income-to-needs ratio, neighborhood quality, and social support. Caregiver history of neglect, respondent living in a spouse-like relationship, and caregiver depression were coded dichotomously for each risk factor (yes/no). The site dummy variables were included as control variables. Separate regression analyses were run for each of the three hypothesized moderators. In each analysis, interaction terms were created between the moderator of interest and each of the nine risk factors.

Given that the ecological model of child maltreatment was used to address this specific aim, it may appear that the data are nested and that a hierarchical logistic model should be used. However, all of the data are measured at the individual level (i.e., only one child per family is included, and neighborhood poverty is measured as the individual's perception of his or her neighborhood poverty), and therefore a hierarchical model is not appropriate. Multiple imputation by chained imputations was used to account for any missing data; twenty datasets were imputed. Only variables with less than 20% missing data were imputed; variables with more than 20% missing data were not included in the analysis.[43] SAS software was used for all analyses.

RESULTS

There were 697 children in the LONGSCAN sample who met the eligibility criteria for the current study. The outcome variable, physical neglect, was missing for 192 children, who were therefore excluded from the study. These 192 children were missing the self-report neglect data and did not have a CPS report. The final sample included in the analysis was 505 children. These children did not significantly differ from those who were excluded from the sample on demographic variables, such as gender, income-to-needs ratio, or maternal age at the birth of the referent child. (See Table 2-2.) They were statistically significantly different from those excluded from the sample on race; there were more Black children in the analyzed sample than in the group of children who were excluded from the analysis.

The majority of the children included in the current analysis were Black (74.7%), and half (50.5%) were female (Table 2-3). The mothers were, on average, 23.3 years of age at the birth of the referent child (minimum 12 years; maximum 42 years) (Table 2-4). The overwhelming majority of the

respondents were female caregivers (97.55%), with most being the child's biological mother (91.2%). The remaining respondents were grandmothers (3.6%), other female relatives (1.6%), foster mothers (.68%), stepmothers (.23%), other females (.23%), or biological fathers (2.0%). The majority of the respondents were not living in a spouse-like relationship (57.2%). 30.6% of the caregivers met CES-D criteria for depression, and 40.9% of the caregivers had experienced maltreatment as children. The average number of children in the household was 3, and the average level of neighborhood quality was 2.5. Even though everyone included in the sample was living in or near poverty, there was still quite a bit of variability in the income-to-needs measure. On average, families had an income-to-needs ratio of .73 (minimum 0.11; maximum 1.97). The average level of perceived social support according to the FSSQ was 38.6 (minimum 10 maximum 50). The average level of support provided by family members was 12.3 (minimum 5; maximum 15). Caregivers reported, on average, moderate levels of neighborhood support (3.43; minimum 1.3; maximum 4.84). Finally, 62.8% of the children in the sample experienced physical neglect.

Multivariate logistic regression analysis was used to examine the association among maternal age, child gender, caregiver depression, caregiver history of maltreatment, income-to-needs ratio, number of children in the home, marital status, neighborhood quality, and physical neglect. Results of this analysis are described in Table 2-5. Net of other factors, children whose caregivers have depression are 1.83 times as likely to experience physical neglect as children whose caregivers are not depressed (95% CI 1.18, 2.83; p=.0072). Children whose caregivers reported experiencing child maltreatment were 1.77 times as likely to experience physical neglect as children whose mothers did not experience maltreatment as a child (95% CI 1.14, 2.74; p=0.0096). Furthermore, children who live in higher quality neighborhoods are .78 times as likely to experience physical neglect as children who live in lower quality areas (95% CI 0.61, 0.999; p=0.0464). None of the other hypothesized predictors of physical neglect were statistically significant in this sample of impoverished children. Logistic regression analyses examining potential moderators indicated that none of the hypothesized social support factors significantly moderate the relationships between the predictors and the outcome.

DISCUSSION

This study examines differences within poverty in the occurrence of physical neglect in early childhood. Previous studies have indicated that factors at the individual, family, and community levels of the ecological framework for child maltreatment are associated with physical neglect. The current study examined variables at these three levels of the framework and the results indicate that there are individual and community level characteristics that predict physical neglect among a sample of impoverished children. Two risk factors and one protective factor were identified in this poor and near poor sample. It was important to include children who live near poverty because it has been suggested that these children may be in similar, or possibly worse, conditions as children living in poverty.[44] This is because children in near poverty may be ineligible for certain programs, such as Temporary Assistance for Needy Families (TANF) and Medicaid, which are available to children in poverty.[44] Therefore, children living near poverty may actually have fewer available resources than children in poverty.

The strongest effect found was for caregiver depression. Children whose caregivers' scores on the CESD indicated depression were almost twice as likely to be physically neglected as children whose caregivers' scores did not indicate depression. These results are similar to previous research that found mothers who did not provide adequate supervision for their child were more likely to meet criteria for clinical depression than mothers who did properly supervise.[22] Another study that sought to identify parental characteristics associated with physical neglect found that caregivers with mental health problems were more likely to physically neglect their children than caregivers who did not have poor mental health.[18] The current study was not able to infer causality and therefore it is not know if caregiver depression causes physical neglect, only that the two are associated.

The current study also found that in an impoverished sample children whose caregivers have a self-reported history of physical and/or sexual abuse are more likely to be physically neglected than children whose caregivers didn't experience abuse in their childhoods even when controlling for other factors. There is an established body of literature that supports this evidence for the intergenerational transmission of child maltreatment[16,19,20] It is interesting that the history of maltreatment variable included in the current analysis only accounted for physical or sexual abuse, yet was still found to be

a significant risk factor for a child experiencing physical neglect. This supports the notion that the intergenerational transmission of child maltreatment is not simply a reenactment of what a caregiver experienced in her/his own childhood, but rather a more complex process.

Children who live in higher quality neighborhoods are less likely to experience physical neglect than children who live in lower quality neighborhoods. This finding is in line with other studies that have found that indicators of neighborhood poverty are associated with child maltreatment[26,27] and neglect in particular.[27] However, both of these studies utilized official reports of child maltreatment and therefore may only have found associations between neighborhood poverty and the likelihood of being reported to CPS, not actual maltreatment. Therefore, the current study adds to this body of literature by including both self-report and CPS reports in its neglect variable. Additionally, neither of the previous studies included only an impoverished sample. That neighborhood quality was found to be a predictor of physical neglect within an impoverished sample is an interesting finding. This indicates that for children whose families have a low income-to-needs ratio, living in a higher quality neighborhood can be a protective factor for physical neglect.

It was unexpected that none of the social support factors were found to moderate the relationship between the proposed risk factors and the occurrence of physical neglect. Previous studies have indicated that levels of social support play a role in the occurrence of physical neglect.[12,28,29] It is possible that social support was operationalized differently in the current study, and therefore none of the social support variables were found to moderate the relationship between the risk factors for physical neglect and physical neglect. This finding is particularly surprising since living in a higher quality neighborhood was found to be a protective factor, which may be due to the emotional and/or tangible support neighbors can provide. Future studies should further explore the role of social support in the occurrence of physical neglect within families living in poverty.

Limitations

This study contributes to the field of child maltreatment by explicitly utilizing an impoverished sample to examine the within poverty occurrence of physical neglect. The current study is novel in that it used two measure of physical neglect to create a composite neglect variable. That said, there

are several limitations to the current study. The first is that the sample is a non-probability, convenience sample. Children in this secondary data analysis were recruited to be in the larger LONGSCAN study because they met certain eligibility criteria, namely they were at risk of maltreatment, had been maltreated, or could serve as a matched control for the study. These children and their families may not be representative of the general population of poor and near-poor families, therefore limiting the generalizability of the current findings to children who participated in the three LONGSCAN sites included in the study. There was a considerable portion of the sample that was excluded from the current analyses because they were missing the self-report measure of physical neglect. However, these children did not significantly differ from those who were included in the analyses on most demographic variables. Another limitation is that the current study is cross-sectional, therefore limiting the ability to make inferences about temporality and causality. Additionally, given the data collection plan for the LONGSCAN study, it is possible for neglect to have occurred before some of the predictors were measured, further limiting interpretations about causality.

Implications of findings

The current findings identified two risk factors and one protective factor for experiencing physical neglect in an impoverished sample. These three factors present opportunities for prevention of physical neglect. Caregiver depression, as measured by the CESD, was found to be a significant predictor of physical neglect in the current study. While depression can interfere greatly with functioning and daily life, it is a highly treatable condition.[45] One way to prevent physical neglect among children living in poverty would be to identify mothers/caregivers who are experiencing depression and provide them with treatment. Physicians or nurses could identify caregivers with depression during routine appointments. Screening tools have been developed for use in primary care settings and most have been found to be effective in recognizing mothers who are struggling with depression.[46] Identification and treatment of maternal depression among those living in poverty may reduce the number of children who experience physical neglect.

A caregiver's self-reported history of physical and sexual abuse was also found to be a significant predictor of physical neglect in an impoverished sample. This highlights the need for the prevention of child abuse and neglect in order to interrupt the cycle of child maltreatment. It has been suggested that intergenerational transmission of child maltreatment occurs because child maltreatment results in insecure attachment styles and this insecure attachment style is represented within the child as an internal working model. An individual who has been maltreated uses this insecure working model as an archetype for future relationships.[47] Therefore, a caregiver who has an insecure attachment style will be unable to form a secure attachment with her own children[46] and may be at-risk of maltreating them as a result.[47,48] It is the parent-child relationship that is transmitted between the generations, not necessarily child maltreatment.[47] There are several interventions that are effective in improving maternal sensitivity and attachment[49] and therefore may reduce the likelihood that a mother who has experienced maltreatment herself will maltreat her child. Mothers who were abused as children could be referred to these intervention programs in order to reduce the likelihood that they will physically neglect their own children.

The current study also determined that poor children who live in higher quality neighborhoods are less likely to experience physical neglect than poor children who live in lower quality neighborhoods. Given that living in a nicer neighborhood appears to be protective for children, it is important to increase affordable housing in more affluent neighborhoods. This could be done through subsidized housing or through US Department of Housing and Urban Development programs (HUD). As a way to improve the lives of children and prevent physical neglect, HUD should be sure to provide affordable housing in affluent neighborhoods, not just in poor neighborhoods, through their programs.

Summary

A within poverty analysis of risk factors for physical neglect among young children indicates that children whose mothers are clinically depressed or who have experienced maltreatment themselves are more likely to be physically neglected than children whose mothers do not have depression or a history of maltreatment. Furthermore, living in a higher quality neighborhood appears

to reduce the likelihood of experiencing physical neglect among children living in poverty. These findings indicate many opportunities for intervention and the prevention of physical neglect.

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TABLE 2-1. *Correlation Matrix: Physical Neglect Items from About My Parents*

	Parents gave enough to eat	Parents kept house clean	Parents gave enough clothes to keep warm	Parents had something to eat when hungry	Parents left home alone after dark	Parents left home alone during day	Parents made sure bathed regularly
Parents gave enough to eat	**1.0**						
Parents kept house clean	0.37182 <.0001	**1.0**					
Parents gave enough clothes to keep warm	0.61582 <.0001	0.43554 <.0001	**1.0**				
Parents had something to eat when hungry	0.62575 <.0001	0.45943 <.0001	0.62917 <.0001	**1.0**			
Parents left home alone after dark	-0.11032 0.0171	-0.11669 0.0114	-0.1239 0.0072	-0.10366 0.0248	**1.0**		
Parents left home alone during day	-0.05397 0.2444	-0.09486 0.0400	-0.08913 0.0535	-0.07234 0.1177	0.61742 <.0001	**1.0**	
Parents made sure bathed regularly	0.38687 <.0001	0.32142 <.0001	0.36368 <.0001	0.25861 <.0001	-0.08873 0.0551	-0.14827 0.0013	**1.0**

Table 2-2. *Differences between those missing outcome data and those not missing outcome data.*

	Not Missing Outcome Data			**Missing Outcome Data**		
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Income-to-needs ratio	436	.73	.49	160	.76	.44
Maternal age	401	23.3	5.9	151	22.9	5.2
	% (N)			**% (N)**		χ^2
Gender						.9791
Male	49.5 (250)			45.3 (87)		
Female	50.5 (255)			54.7 (105)		
+Race						p=9.224 E-04
White	16.4 (83)			15.2 (29)		
Black	74.7 (377)			63.9 (122)		
Hispanic	3.2 (16)			8.9 (17)		
Native American	.20 (1)			1.1 (2)		
Multi-Racial	4.95 (25)			9.95 (19)		
Other	.59 (3)			1.1 (2)		

[+] Fisher's exact test was used to examine differences in race.

TABLE 2-3. *Sample Characteristics: Categorical Variables.*

Variable	**Percentage (n)**
Race	
White	16.4 (83)
Black	74.6 (377)
Hispanic	3.2 (16)
Native American	.20 (1)
Multi-Racial	5.0 (25)
Other	.59 (3)
Relationship to child	
Biological mother	91.2 (402)
Grandmother	3.63 (16)
Stepmother	.23 (1)
Other female rel.	1.6 (7)
Foster mother	.68 (3)
Other female	.23 (1)
Biological father	2.0 (9)
Other	.45 (2)
Relationship status	
No Mate	57.2 (251)
Married	21.6 (95)
Partner	21.2 (93)
Female	50.5 (255)
Caregiver depression	30.7 (155)
Caregiver history maltreatment	40.9 (178)
Physical neglect	62.8 (317)

TABLE 2-4. *Sample Characteristics: Continuous Variables.*

Variable	Mean	SD	Range
Income-to-needs ratio	.73	.491	.11 – 1.97
Maternal age	23.33	5.92	12 - 42
Neighborhood quality	2.53	.87	1 - 4
Number of children in household	3.03	1.68	1 - 13
FAPGAR	12.30	2.66	5 - 15
SSQBTOT	38.60	8.73	10 - 50
Neighborhood Support	3.40	.73	1.32 – 4.84

TABLE 2-5. *Final Model: Predictors of physical neglect among an impoverished sample. Logistic regression analysis results.*

Parameter	OR	95% CI	P value
Intercept	2.18	.56 – 8.46	.26
CES-D	1.82	1.18 – 2.83	.01
Neighborhood quality	.78	.61 – 1.0	.05
Maternal history of maltreatment	1.77	1.14 – 2.74	.01
Income-to-needs ratio	.73	.47 – 1.14	.17
Gender	.83	.57 – 1.22	.35
Maternal age	1.03	.99 – 1.07	.19
Number of children in household	1.04	.92 – 1.17	.57
No mate	.96	.56 – 1.63	.87
Married	.80	.41 – 1.54	.50
Eastern Site	.77	.47-1.25	.28
Midwestern Site	.96	.57-1.64	.50

INTRODUCTION

Child maltreatment is a significant problem in America. Estimates place the number of children maltreated annually in the U.S. between 772,000[1] and 2.9 million.[2] The forms of child maltreatment included in that number are sub-divided into physical neglect, physical abuse, sexual abuse, emotional abuse, and medical neglect.[3] According to the 2005-2006 National Incidence Study (NIS-4) 4.0% of children experience child maltreatment each year.[2] Neglect is the most common and accounts for the majority of the official reports.[1,2,4] According to the NIS-4, neglect accounted for sixty-one percent of maltreated children.[3] Neglect also results in more deaths each year than any other type of maltreatment.[4] The NIS-4 found rates of 6.5 per 1,000 children for physical abuse, 2.4 per 1,000 for sexual abuse, and 16.2 per 1,000 for physical neglect each year.[2] Other data support the conclusion that there are high rates of neglect; a 2002 anonymous telephone survey of mothers in North and South Carolina determined that in a one month period, 14 per 1,000 children experience physically neglectful behaviors.[5] Since maltreatment often occurs in private, these numbers likely underestimate the true extent of the problem.[6] Among all the forms of neglect, physical neglect is the most frequent[2] and therefore will be the focus of the current study.

Neglect is difficult to operationalize because it refers to acts of omission rather than commission on the part of caregivers.[7] It has been defined as the failure of a caregiver to provide adequate care or supervision for a child or to meet his or her basic needs.[8] Numerous definitions of neglect exist in the literature,[5] however there are certain behaviors that all researchers consider neglectful,[5] including “inadequate nutrition, clothing, hygiene; inadequate medical, dental, or mental health care; unsafe environments; inadequate supervision, including inadequate caretakers (sic); abandonment, or expulsion from the home”.[5] There are multiple subtypes of physical neglect, such as failure to provide and lack of supervision.[7,9] The current study addresses physical neglect, including the failure to provide appropriate food, clothing, shelter, supervision, and a safe

environment for the child.[5] While the failure to provide appropriate medical care is sometimes included in the definition of physical neglect;[5] this study does not include medical neglect.

Neglect has been reported to have a negative impact on child development.[10-17] Specifically, neglect has been shown to affect aspects of biological, emotional, cognitive, and behavioral development. [10-17] Interestingly, some evidence suggests that neglect has a worse effect on developmental outcomes than other forms of maltreatment.[10,11] However it is important to note that not all studies support this finding.[12] These differences may be because all three studies examining this issue utilized convenience samples and used different measures of development.[10-12]

Neglect has been linked with poor brain and cognitive development. In one study, neglect was associated with a thirteen percent reduction in total corpus callosum area.[10] Importantly, neglect was found to be a more significant contributor to a reduction in corpus callosum size than physical abuse, sexual abuse, or Post Traumatic Stress Disorder.[10] Children who have been neglected demonstrate difficulty recognizing and distinguishing emotions based on facial expressions compared to physically abused and control children.[11] Neglect has also been found to be associated with cognitive deficits[12] and poor academic achievement.[14] Children who were neglected, as well as children who were abused, were found to have lower scores on measures of receptive language and IQ than non-maltreated children.[12] Additionally, a study comparing the school readiness of children from middle class families, children from families who receive Aid to Families with Dependent Children (AFDC), and children who had been maltreated (the majority neglected) determined that maltreated children were less ready to learn than the other two groups of children.[13] Neglected children receive lower grades in Math and English than non-maltreated children across kindergarten to twelfth grade.[14] However, not all studies have found an association between neglect and poor cognitive outcomes.[17] This may be due to how neglect was defined or measured in these studies. The two studies that found a relationship between neglect and poor cognitive outcomes used CPS reports to determine a child's neglect status;[12,13] the study that did not find a relationship used multiple sources, including interviewer assessment of the home environment, observations of parent-child interactions, and maternal report, to determine neglect status.[17]

Children who have been neglected have more behavior problems than children who have not been neglected.[12,15-17] Specifically, neglected children have been reported to engage in fewer social interactions[12] and be more aggressive[16] than children who were not neglected. Interestingly, one study determined that early neglect was more predictive of later aggression than early abuse, later abuse, or later neglect[15] indicating that the developmental timing of neglect plays an important role in the experience of negative developmental outcomes. Additionally, cumulative neglect has been found to be positively associated with internalizing behavior problems.[17]

Poverty has also been found to be associated with poor developmental outcomes,[18-21] specifically, cognitive development,[18,19,21] school engagement,[20] and behavior problems.[21] However, given that neglect occurs more frequently in low income families than higher income families,[2] it is difficult to disentangle the effects of neglect from living in poverty on child outcomes. It has been suggested that the quality of the home environment, as well as maternal sensitivity, may mediate the relationship between poverty and cognitive development;[21] however this relationship has not been found for all developmental outcomes.[22] No studies have examined the relationship among poverty, neglect, and developmental outcomes specifically; all have used measures of poor parenting,[21,22] but not necessarily neglect. Therefore, when considering the impact of neglect on the development of children over time, it is important to consider the effects of living in poverty.

Numerous studies have examined the impact of neglect on developmental outcomes, but only one study utilized longitudinal methods to explore the effect of neglect on development, specifically aggressive behavior.[15] However, in addition to only examining one developmental outcome, this study used CPS records to identify the maltreatment status of the sample and does not include non-maltreated children,[15] thereby limiting comparisons to a non-maltreated population. Therefore, it is not clear what effect neglect has on development over time among impoverished children.

There are other factors to consider when examining the influence of neglect on the developmental outcomes of impoverished children. Bronfenbrenner's ecological systems model posits that development occurs within the context of nested, interconnected systems.[23] The four levels of this model refer to the immediate setting of the developing person, the setting in which the

developing person participates, surroundings that affect the person, but with which he/she does not engage, and finally the culture in which the other levels are embedded.[23] According to Bronfenbrenner, a person's development is affected by all levels of this system, as well as by the relationships between the levels.[23] Given that this model suggests that development occurs within the context of various settings, both immediate and distal to the individual, it is useful guiding the selection of other variables to control for when isolating the effect of physical neglect on development in an impoverished sample. Variables at the individual, family, and community levels of the ecological systems model have been found to be associated with developmental outcomes in children. It has been suggested that because maternal education has been found to be associated with most developmental outcomes, it is important to control for it in studies of child development.[24] Maternal depression has also be linked to developmental outcomes. Children whose mothers have depression have been found to display more behavior problems,[25-27] more internalizing symptoms,[28] and to be at risk for cognitive problems[29] compared to children of non-depressed mothers. Caregiver marital status is associated with cognitive development,[30] behavior problems,[30,31] and internalizing symptoms.[31] Neighborhood poverty has also been found to have an influence on developmental outcomes, such as school achievement,[32] internalizing behaviors,[33] and behavior problems.[33] Given that these four characteristics have been found to be associated with developmental outcomes, they will be included in the current study as control variables.

The key to understanding the impact of physical neglect on child development is to disentangle the effects of neglect from those of poverty. Poverty is associated both with the occurrence of neglect[2] and with poor developmental outcomes.[18-22] Given the confounding of poverty and neglect, it is difficult to isolate the role of neglect on child development among children living in poverty. While previous literature has established relationships between poverty and poor developmental outcomes, as well as neglect and developmental outcomes, it is not clear what effect physical neglect has on the developmental trajectories of children above and beyond the effects of poverty. The current study will serve to fill in this gap in the literature by examining the within poverty differences of the effects of neglect on child development, specifically by assessing the effect of neglect on the developmental trajectories of impoverished children. This will be accomplished by

comparing the developmental trajectories of children who are impoverished and neglected to children who live in poverty but did not experience neglect. The following hypothesis will be tested:

> In an impoverished sample, physical neglect will have a detrimental effect on the trajectories of academic performance, internalizing behaviors, and externalizing behaviors of children when controlling for parental education level, caregiver depression, marital status, and neighborhood quality.

METHODS

A secondary data analysis of a subset of the Longitudinal Studies in Child Abuse and Neglect (LONGSCAN) dataset will be used to address the specific aim of this study. LONGSCAN is a national consortium of longitudinal studies of child maltreatment.[34] Five sites contribute data to LONGSCAN,[34] each with their own goals and study aims. However, given their use of similar data collection schedules and common measures the data from these sites can be combined for analyses.[34] Data from the Southern, the Midwestern, and the Eastern sites include children who are at-risk for being maltreated, children who were maltreated, and controls. Therefore, the dataset for the current study contains both children who were physically neglected and children who did not experience any form of maltreatment. If a child did not experience physical neglect, but did have a report of maltreatment according to CPS records, he/she was excluded from the current sample. This was done so that the control group would include children who were not neglected, as well as children who did not have a CPS report of any kind. 26 children were excluded from the sample. Children who experienced physical neglect in the current sample may also have experienced other forms of maltreatment. Data from when the children were younger than 4 years of age through 14 years of age were included in the analyses. Data from all three sites were used to examine internalizing and externalizing behavior. Two of the sites were used to examine academic performance. The Eastern site was excluded from the academic performance analysis because it did not have any academic performance data. This secondary data analysis received approval from the Public Health-Nursing Institutional Review Board at the University of North Carolina at Chapel Hill.

Variables

The following outcome variables were used in the current analysis:

Academic performance: The Teacher Report Form (TRF) is used to assess the academic achievement of children enrolled in LONGSCAN. This instrument asks teachers to rate the child's academic success in each subject.[35] The child's performance is rated on a five point scale with one representing far below grade level and five indicating performance that is far above grade level.[35] The TRF has been found to be a relatively reliable measure of academic achievement in children.[35] This instrument has an inter-rater reliability of .60, a test-retest value of .62 – .96, and an internal consistency of .72-.95.[35] Data from the TRF at 8, 12, and 14 years of age were used as a continuous measure of academic achievement.

Internalizing behavior: Subscales of The Child Behavior Checklist (CBCL)[36] are used to assess the internalizing behavior of children enrolled in LONGSCAN. The CBCL has been found to be a reliable measure of behavioral and emotional problems in children.[36] This instrument has an inter-rater reliability of .93-.96, a test-retest value of .95 – 1.00, and an internal consistency of .78-.97.[31] Raw scores of the internalizing subscale collected at 8, 12, and 14 years of age was used.

Externalizing behavior: Subscales of The Child Behavior Checklist (CBCL)[36] are used to assess the externalizing behavior of children enrolled in LONGSCAN. The CBCL has been found to be a reliable measure of behavioral and emotional problems in children.[36] This instrument has an inter-rater reliability of .93-.96, a test-retest value of .95 – 1.00, and an internal consistency of .78-.97.[36] Raw scores of the externalizing symptoms subscale collected at 8, 12, and 14 years of age was used.

The exposure variables of neglect and poverty were measured as described below:
LONGSCAN has given careful attention to measurement and while a large portion of the maltreatment records have been obtained from social service agencies, the resulting information has

been examined and recoded along research classifications that address the measurement problems of prior studies using official records.[7]

Neglect: A physical neglect variable was constructed from CPS records and from About My Parents (a youth self report measure of neglect). Only physical neglect that occurred before the age of eight was included in the current analyses. Given that neglect occurs more frequently among younger children,[3,37] this accounts for most cases of neglect. Both unsubstantiated and substantiated reports of physical neglect, according to CPS records, were included in the neglect variable. Unsubstantiated reports were included in addition to substantiated reports because it has been suggested that outcomes for children do not differ when comparing substantiated cases to unsubstantiated cases of maltreatment.[38] The CPS reports variable was coded dichotomously (yes/no). An indication of physical neglect by a child on six items from the About My Parents instrument at the age twelve data collection point were used to determine neglect status for this instrument. These six items ask the child to retrospectively report on their experiences in elementary school. A correlation matrix was run for these six items and two separate variables emerged through visual inspection: Supervisory Neglect and Failure to Provide (Table 3-1). Two items comprised the Supervisory Neglect variable and four items comprised the Failure to Provide variable. These data were also coded dichotomously (yes/no). If a child endorsed either “Sometimes” or “A lot” for an item, that item was coded as “yes”. If a child endorsed “Almost never” or “Never” for an item, that item was coded as “no”. Positively phrase items were reverse coded (i.e. I was given enough to eat). If any of the items were coded as “yes” then the child was coded as experiencing physical neglect.

Given the biases inherent in each source, it is important to use two measures to comprise the physical neglect variable in order to ensure as complete a measure of neglect as possible. Therefore, two sources of neglect data were used to comprise the physical neglect variable used as the outcome for this study. If the CPS reports variable, the self report of supervisory neglect variable, or the failure to provide variable were endorsed (=1), then the neglect variable was coded as 1. If none of the three physical neglect variables were endorsed, then the neglect variable was coded as 0. There was some correspondence between CPS reports and self-report of physical neglect. 45 children were identified

by both CPS and self-report as have experienced physical neglect; 70 children were identified by CPS report as being physically neglected, but not self-report; 112 children were identified by self-report and not by CPS; and 90 children had CPS reports of physical neglect, but were missing self-report data. The distribution of risk factors for neglect did not differ greatly between these groups. The only differences were regarding caregiver's history of maltreatment and the number of children living in the home. The caregivers of children who were known to CPS only were more likely to have a history of physical or sexual abuse than children who were identified by self-report only. The same was true for children who were known to CPS and were missing self-report data. Children who only had a CPS report lived with more children than children who were identified by self-report only. The same was true for children who were identified by CPS reports and self-report and children who were known to CPS and were missing self-report data.

Poverty: An income-to-needs ratio was constructed in order to measure poverty. Family income is collected from LONGSCAN participants as part of a project developed measure and it was divided by the appropriate U.S poverty income guideline for that particular family size and the year of data collection in order to calculate the income-to-needs ratio. The income information, as well as family size information, collected at the first data collection time point was used to generate the income-to-needs ratio. In LONGSCAN, income is collected as a categorical variable. Given this, the mid point of each income category was used as the income variable in the income-to-needs ratio. The income-to-needs ratio was included in the analysis as a continuous variable. This included children who live in poverty, as well as those who are near poverty. Therefore, the children included in the analysis had an income-to-needs ratio that was equal to or less than 1.99.

Child's race: Information regarding the race of the child was taken from demographic data collected as part of a project developed measure. These data are categorical with White coded as 1, Black coded as 2, Hispanic coded as 3, Native American coded as 4, Multi-Racial coded as 5, and Other coded as 6. These data were not included in regression analyses, but were used to describe the sample.

Respondent's relationship to child: Information regarding the relationship of the respondent to the child was obtained from the Caregiver Interview. These data are categorical with biological mother coded as 1, adoptive mother coded as 2, grandmother coded as 3, stepmother coded as 4, other female relative coded as 5, foster mother coded as 6, other female coded as 7, biological father coded as 8, and other coded as 14. Data collected at the 0-4 interviews were used for the current study. These data were not included in the regression analysis, but were used to describe the sample.

Control Variables:

Caregiver mental health: The Center for Epidemiological Studies-Depression Scale (CES-D) is used to measure the depression status of the mother in LONGSCAN. This is a widely used measure of depression.[39,40] Scores greater than or equal to sixteen indicate depression. Data collected at the second wave (age four) of data collection were used in the proposed analyses. This variable was coded dichotomously (yes/no). If a mother scored 16 or higher on the CES-D she was coded as having experienced depression. If a mother scored lower than 16, she was coded as having not experienced depression.

Single parent: A project developed measure of family/household composition collects these data. Data collected at the assessment at age four were used in the proposed analyses. This variable measured if the respondent was living in a spouse-like relationship. Given that multiple categories were used to measure this variable, three dummy variables were created: No adult mate, living with a wife/husband, and living with a male or female partner.

Neighborhood quality: A project developed measure of neighborhood characteristics generates these data. Data collected at the first wave of data collection were used in the proposed analyses. Four items from this measure that indicate the quality of the neighborhood were used to create this variable. An average of the four items was used because it was not hypothesized that one of the

items would be a stronger indication of neighborhood quality than any of the others. This variable ranges from 1 (very much like my neighborhood) to 4 (not at all like my neighborhood). The four items included in this variable are: Most people in this neighborhood are on welfare; It's dangerous in this neighborhood; The buildings and yards in this neighborhood are really run down; and There are people in this neighborhood who might be a bad influence on my child(ren). High scores on this measure of neighborhood quality indicate higher quality. This variable was used as an indicator of neighborhood poverty.

Years of Education (Caregiver): A project developed measure of caregiver demographics collects these data. Data collected at the assessment at age four were used in the proposed analyses. This variable was included as a continuous measure of years of education.

Site: Dummy variables were created for each of the LONGSCAN sites included in the current analysis, with the Southern site as the referent category.

ANALYSIS

A secondary data analysis of the LONGSCAN project was used to address the aim of the current study. In order to be included in the current analysis, children must live with families that are poor or near poor (income-to-needs ratio below 2.0). Children who were included in the neglected group must have experienced physical neglect by the age of eight. Children in the non-neglected group must not have experienced any form of maltreatment before the age of eight.

Conditional Latent Curve Modeling (LCM) was used to compare the academic, internalizing, and externalizing developmental trajectories of both groups (neglected and non-maltreated) through age fourteen. It is possible through LCM to examine the underlying latent trajectory of developmental phenomenon by modeling repeated measures of development.[41] Neglect status was included as a predictor and the intercept and slope of the developmental trajectories for both groups were evaluated. This allowed even minor differences in trajectories to be detected.[41] Additionally, given that factors other than neglect may affect development, conditional LCM analyses were conducted. As

previously mentioned, physical neglect was measured by an index comprised of items from a self-report measure and CPS records. Physical neglect was coded dichotomously (yes/no). Additionally, the following factors have also been shown to impact child development: education level of the caregiver, [24] caregiver depressive symptoms, [25-29] marital status,[30,31,42] and neighborhood poverty[32,33,43,44]and were therefore included in the analyses as covariates. Caregiver education level was included in the analysis as continuous variables. Single parent household, caregiver depression, and neighborhood quality were coded dichotomously (yes/no). These risk factors reflect three levels of the ecological framework for child maltreatment. The fourth level, society, is not included because there is no measure at this level in the LONGSCAN dataset. Mplus software was used for all analyses. The following equations demonstrate the models that were examined:

Academic Performance:

$$Y_{it} = (\mu_\alpha + \lambda_t\mu_\beta) + (\gamma_{\alpha i} + \lambda_t\,\gamma_{\beta 1})x_{1i} + (\gamma_{\alpha 2} + \lambda_t\,\gamma_{\beta 2})x_{2i} + (\gamma_{\alpha 3} + \lambda_t\,\gamma_{\beta 3})x_{3i} + (\gamma_{\alpha 4} + \lambda_t\,\gamma_{\beta 4})x_{4i} + (\gamma_{\alpha 5} + \lambda_t\,\gamma_{\beta 5})x_{5i} + (\gamma_{\alpha 6} + \lambda_t\,\gamma_{\beta 6})x_{6i} + (\xi_{\alpha i} + \lambda_t\xi_{\beta i} + \varepsilon_{it})$$

Where μ_α = mean of the intercepts, μ_β = mean of the slopes λ_t = value of trend variable for time t, γ_α = covariate coefficients for the random intercept, γ_β = covariate coefficients for the random slope, ξ = the disturbance, x_1 = education level of caregiver, x_2 = caregiver depressive symptoms, x_3 = single parent household, x_4 = income-to-needs ratio, x_5 = neighborhood poverty, and x_6 = neglect.

Internalizing behavior:

$$Y_{it} = (\mu_\alpha + \lambda_t\mu_\beta) + (\gamma_{\alpha i} + \lambda_t\,\gamma_{\beta 1})x_{1i} + (\gamma_{\alpha 2} + \lambda_t\,\gamma_{\beta 2})x_{2i} + (\gamma_{\alpha 3} + \lambda_t\,\gamma_{\beta 3})x_{3i} + (\gamma_{\alpha 4} + \lambda_t\,\gamma_{\beta 4})x_{4i} + (\gamma_{\alpha 5} + \lambda_t\,\gamma_{\beta 5})x_{5i} + (\gamma_{\alpha 6} + \lambda_t\,\gamma_{\beta 6})x_{6i} + (\xi_{\alpha i} + \lambda_t\xi_{\beta i} + \varepsilon_{it})$$

Where μ_α = mean of the intercepts, μ_β = mean of the slopes λ_t = value of trend variable for time t, γ_α = covariate coefficients for the random intercept, γ_β = covariate coefficients for the random slope, ξ = the disturbance, x_1 = education level of caregiver, x_2 = caregiver depressive symptoms, x_3 = single parent household, x_4 = income-to-needs ratio, x_5 = neighborhood poverty, and x_6 = neglect.

Externalizing behavior:

$$Y_{it} = (\mu_\alpha + \lambda_t\mu_\beta) + (\gamma_{\alpha i} + \lambda_t\,\gamma_{\beta 1})x_{1i} + (\gamma_{\alpha 2} + \lambda_t\,\gamma_{\beta 2})x_{2i} + (\gamma_{\alpha 3} + \lambda_t\,\gamma_{\beta 3})x_{3i} + (\gamma_{\alpha 4} + \lambda_t\,\gamma_{\beta 4})x_{4i} + (\gamma_{\alpha 5} + \lambda_t\,\gamma_{\beta 5})x_{5i} + (\gamma_{\alpha 6} + \lambda_t\,\gamma_{\beta 6})x_{6i} + (\xi_{\alpha i} + \lambda_t\xi_{\beta i} + \varepsilon_{it})$$

Where μ_α = mean of the intercepts, μ_β = mean of the slopes λ_t = value of trend variable for time t, γ_α = covariate coefficients for the random intercept, γ_β = covariate coefficients for the random slope, ξ = the disturbance, x_1 = education level of caregiver, x_2 = caregiver depressive symptoms, x_3 = single parent household, x_4 = income-to-needs ratio, x_5 = neighborhood poverty, and x_6 = neglect.

RESULTS

Academic Performance

There were 441 children in the Midwestern and Southern LONGSCAN samples who met the eligibility criteria for this analysis. A little more than half of the children in the current analysis were Black (59.4%) and (54.9%) female (Table 3-2). The overwhelming majority of the respondents were female caregivers (98.5%), with most being the child's biological mother (92.9%). The remaining respondents were grandmothers (3.3%), other female relatives (1%), foster mothers (0.8%), stepmothers (0.5%), other females (1%), or biological fathers (1%). There were no respondents in the current sample who were the child's adoptive mother. Half of the respondents were not living with a spouse-like partner (51.8%). The average level of education was 11.2 years and the majority of the sample had a high school education or less (83%) (Table 3-3). 31% of the caregivers met CES-D criteria for clinical depression. The average level of neighborhood quality was 2.6 (minimum 1; maximum 4). Even though everyone included in the sample was living in or near poverty, there was still quite a bit of variability in the income-to-needs measure. On average, families had an income-to-needs ratio of .76 (minimum 0.09; maximum 1.98). 64% of the sample experienced physical neglect. On the academic performance subscale of the TRF, children scored on average 253.4 at age eight, 241.4 at age twelve, and 260.7 at age fourteen.

Conditional LCM indicated that children who are physically neglected significantly differ from children who are not physically neglected on a measure of academic achievement (Table 3-6).

Specifically, children who have experienced physical neglect before the age of eight are rated on average 44.86 units below (p=.000) children who have not been physically neglected on academic achievement at age eight when controlling for education level of the mothers, caregiver depressive symptoms, single parent households, neighborhood quality, and LONGSCAN site. While not significant at the p<.05 level, there was a difference in the rate of change in academic performance with the scores of children who were physically neglected increasing at a higher rate than children who were not physically neglected (17.94, p=0.054). Furthermore, the negative covariance between the slope and the intercept indicates that children who start higher on this measure of academic performance increase less steeply in their scores over time. Also, children who lived in higher quality neighborhoods were rated on average significantly higher on academic achievement at age eight than children who live in lower quality neighborhoods (18.7, p=0.007) net of the other predictors in the model. This model fits the data well. It has the following fit indices: χ^2(9, N=441)= 5.2, p=.8163, *CFI* = 1.0, *TLI* = 1.12, *RMSEA* = .000, *SRMR* = .017. However, the residual variances indicate that there is a lot of variability that is not accounted for by the model.

There were many children who were missing TRF data at ages eight, twelve, and fourteen. While Mplus utilizes Maximum Likelihood estimation, and therefore all available data were included in the analysis, it is still important to consider how children with missing data differ from those who were not missing data. Analyses showed that there were only two significant differences between children who were missing data and children who were not on key demographic variables. Racial differences were found between children who were missing academic performance data at ages twelve and fourteen those who were not (p=.021 and p=.016, respectively) (TABLE 3-7). There were more Black and fewer Hispanic and multiracial children who were not missing academic performance data at age twelve. The data at age fourteen had similar racial distributions; however there were no differences in the proportion of multiracial children between those with and without missing academic performance data. Children whose mothers were older at their birth were more likely to have missing academic performance data at age eight (p<.0083). However, the mothers of children who were missing academic performance data were only 1.57 years older than the mothers of children who did not have missing outcome data at age eight.

Internalizing and Externalizing Behaviors

There were 697 children in the Midwestern, Southern, and Eastern LONGSCAN samples who met the eligibility criteria for these analyses. The majority of the children in the current analysis were Black (71.7%) and half (51.7%) were female (Table 3-4). The overwhelming majority of the respondents were female caregivers (98%), with most being the child's biological mother (91.6%). The remaining respondents were grandmothers (3.8%), other female relatives (1.49%), foster mothers (0.7%), stepmothers (0.3%), other females (0.2%), or biological fathers (1.7%). There were no respondents in the current sample who were the child's adoptive mother. The majority of the respondents were not living with a partner in a spouse-like relationship (56%). The average level of education was 11.26 years with about half of the mothers completing at least high school (52.5%) (Table 3-5). 30% of the caregivers met criteria for clinical depression, according to the CES-D. The average level of neighborhood quality was 2.6 (minimum 1; maximum 4). Even though everyone included in the sample was living in or near poverty, there was still quite a bit of variability in the income-to-needs measure. On average, families had an income-to-needs ratio of .73 (minimum 0.089; maximum 1.98). 62.8% of the sample experienced physical neglect. The average scores on the CBCL internalizing symptoms subscale was 6.13 at age eight, 6.82 at age twelve, and 6.50 at age fourteen. The average scores on the CBCL externalizing symptoms subscale were 10.89 at age eight, 10.44 at age twelve, and 10.76 at age fourteen.

Internalizing Behavior

Conditional LCM indicated that the trajectories for internalizing behavior did not differ significantly between children who had experienced physical neglect and those who did not (Table 3-6). Children whose caregivers have depression displayed more internalizing behaviors at age eight than children whose mothers were not depressed (1.44, p=.006) when controlling for neglect status, single parent households, and neighborhood quality. There was a trend that indicated that for every additional year of maternal education, children are rated .294 units less on the internalizing symptoms portion of the CBCL at age eight (p=0.061) when controlling for the same factors. Furthermore, this model an adequate fit of the data and had the following fit indices: χ^2(10, N=697)= 20.296, p=.03, *CFI*

= .98, *TLI* = .93, *RMSEA* = .038, *SRMR* = .014. However, the residual variances indicate that there is a lot of variability that is not accounted for by the model.

Externalizing Behavior

Conditional LCM analyses demonstrated that the trajectories for externalizing behaviors did not statistically significantly differ between children who had experienced physical neglect and those who did not (Table 3-6). However, caregiver depression was found to play a role in externalizing behaviors. Children whose caregivers had depression according to the CES-D displayed more externalizing behaviors according to the CBCL at age eight than children whose caregivers did not (1.798, p=0.017), even when controlling for neglect status, maternal education level, single parent households, and neighborhood quality. Additionally, there was a significant difference in the rate of change in externalizing problems with the scores of children whose mothers had more education increasing at a higher rate than children whose mothers had less education (0.270, p=0.042). Children whose caregivers have depression had scores that increased at a higher rate than children whose caregivers were not depressed. However, this was also only a trend and not statistically significant (0.859, p=0.057). This model also adequately fit the data: χ^2(10, N=697)= 12.009, p=.2844, *CFI* = .997, *TLI* = .990, *RMSEA* = .017, *SRMR* = .008. However, the residual variances indicate that there is a lot of variability that is not accounted for by the model.

DISCUSSION

This study examines the within poverty differences in the academic, internalizing, and externalizing developmental outcomes of children who have experienced physical neglect compared to children who have not. Previous studies have indicated that factors at the individual, family, and community levels of the ecological framework impact these developmental domains. The current study controlled for variables at these three levels of the ecological framework in order to isolate the effect of neglect on child development in an impoverished sample. Physical neglect was found to have an impact on one of the three developmental trajectories. Additionally, predictors at the individual and community levels of the ecological framework were found to be associated with the

developmental trajectories of impoverished children. It was important to include children who live near poverty because it has been suggested that these children may be in similar, or possibly worse, conditions as children living in poverty.[45] This is because children in near poverty may be ineligible for certain programs, such as WIC and Medicaid, which are available to children in poverty.[45] Therefore, children living near poverty may actually have fewer available resources than children in poverty.

Among an impoverished sample, children who have been neglected have worse academic performance at age eight than children who were not physically neglected. This finding is consistent with other studies that determined that children who have experienced neglect have worse grades[46,47] and test scores [46,48] than nonmaltreated children. It has also been suggested that children who have experienced neglect are more likely to repeat grades and be referred for disciplinary actions, including suspensions than non-maltreated children. [47] Additionally, the academic performance of children who have experienced physical neglect increases slightly more steeply than children who have not been neglected. This does not necessarily indicate that children who were neglected catch up to or surpass children who were not physically neglected on this measure of academic performance. In fact, a comparison of the average academic performance scores at ages twelve and fourteen of the children who experienced physical neglect to those who didn't indicates that those who were neglected consistently score lower on academic performance (age 12: 234.6 compared to 264.9; age 14: 251.7 compared to 267.8). A previous study determined that while the English and Math grades of neglected children were parallel to children who were not neglected, they were lower at each grade level.[14] However, it is interesting that the academics of children who experience neglect improve over time at a faster rate than children who have were not neglected. This may be because as children get older, they are less dependent on their parents to meet their needs. Therefore, children whose basic needs were neglected during early childhood (before the age of eight), may find other sources as they get older to meet their needs, such as school breakfast/lunch programs or friends. It is possible that once other sources of food, shelter, clothing, or supervision are found, children are better able to focus on school and therefore improve their school performance. The present study's findings, in conjunction with previous research, indicate that children who are neglected struggle in many aspects of academic development when compared to non-maltreated

children. However, as neglected children get older they improve academically; yet do not catch up to their non-neglected peers.

The current study also suggests that within an impoverished sample, children who live in higher quality neighborhoods fair better academically at age eight than children who live in lower quality neighborhoods. This finding is consistent with a study conducted in Canada that determined that indicators of neighborhood poverty are negatively associated with verbal abilities in preschool children.[49] Furthermore, living in a higher quality neighborhood has been found to be associated with higher scores on receptive language among pre-kindergarten children.[50] It has also been suggested that children who live in affluent neighborhoods have higher IQ scores than children who live in poor neighborhoods, even when controlling for family level income.[51,52] Living in a higher quality area may be protective because there may be more resources available, such as libraries and youth programs,[45] thus providing a richer environment in which the child can develop. It is also possible that children living in higher quality neighborhoods have access to better teachers and schools, which in turn improves their academic performance when compared to impoverished children who live in lower quality neighborhoods. The association between neighborhood quality and academic performance could be important to consider when addressing issues of assigning children to attend their neighborhood schools versus busing them to schools in higher quality neighborhoods.

It is unexpected that physical neglect did not have an effect on either externalizing or internalizing behaviors among an impoverished sample of children. Previous research has suggested that children who experience neglect demonstrate more behavior problems[,12,15,16] and internalizing symptoms[17] than children who have not been neglected. Studies that have found an association between physical neglect and externalizing problems utilize somewhat different sources of maltreatment data than the current study. Two of the studies relied solely on CPS reports,[12,15] while the other two studies used multiple sources, including home visitor ratings and questionnaires.[16,17] It is possible that the current study did not replicate previous findings because physical neglect was operationalized differently. Additionally, while some of the previous studies controlled for poverty status,[12,15,16] only one study conducted a within poverty analysis.[17] This study did not find that physical neglect was associated with externalizing problems, but did find an association between

experiencing cumulative neglect and internalizing problems.[17] This study also included preschool aged children, rather than elementary and middle school aged children. It is possible that the effects of physical neglect manifest themselves differently in older children compared to younger children. One study, by Kotch et al, which found an association between early neglect and aggression at age eight also utilized children from LONGSCAN and at first glance it may be surprising that the current study did not replicate the findings. However there are significant differences between the current study and the Kotch et al study that may account for the disparate findings. First, the previous study included all five LONGSCAN sites in the analyses,[15] while the current study only included three. The two LONGSCAN sites not included in the current study consist of children who have been removed from their biological parent's care and children who are moderate risk for recurring child maltreatment;[53] therefore children included in the Kotch et al study may have experienced more severe maltreatment than those included in the current study. Another difference is that the current study utilized the externalizing behaviors subscale while the previous study used the aggression subscale[15] as the outcome. As previously mentioned the Kotch et al study used CPS reports to identify children who were physically neglected while the current study used self-report as well as CPS reports. The final difference is that the Kotch et al study distinguished between early neglect (before the age of two) and later neglect and found an association between early neglect and aggression at age eight, but not later neglect. The current study did not distinguish between early and late neglect and this may also account for the difference in findings. Given the results of the current study, as well as previous studies, it is possible that physical neglect does not have a detrimental effect on internalizing and externalizing behaviors, above and beyond the effects of poverty. Future studies are needed to explore this relationship further.

While physical neglect was not associated with behavior problems among an impoverished sample, caregiver depression, as measured by the CESD, was. Specifically, children whose caregivers experience depression demonstrate more externalizing problems at age eight than children whose caregivers did not have depression. This is consistent with other studies, which have determined that maternal depression is associated with the externalizing behaviors of children,[25,26] as well as with an increase in externalizing behaviors over time.[26] While the mechanism for why this

occurs is not clear, it is possible that caregivers with clinical depression have less energy to offer their children, therefore providing less attention and/or discipline, resulting in children with more behavior problems than children whose caregivers do not have clinical depression. It is also possible that caregivers experience depression due to their children's externalizing behaviors or that there is a reciprocal relationship between caregiver depression and externalizing behaviors.[54] However, there may also be an issue of respondent bias. In the current study, the same respondent provided information regarding externalizing behaviors and depressive symptoms and therefore may have distorted the amount of externalizing behaviors her child demonstrated. One study found that low-income caregivers with dysphoria rate the behaviors of their children more harshly than caregivers without dysphoria.[55] However, this dysphoria-bias did not accounted for the majority of the variance in the model examined.[55] Caregiver education was also related to externalizing problems in children. Externalizing behaviors of children whose mothers have more education increase slightly more steeply than children whose mothers have less education. It is not clear why this finding may have occurred. In fact, high maternal education has been found to be associated with fewer problem behaviors in children.[56,57] It is possible that in the current sample mothers with more education are more aware of their child's misbehavior. Mothers in the current study were not on average highly educated; only fifteen percent had education beyond high school. This is contrasted with the other studies that found an inverse relationship between maternal education and behavior problems; the mothers in the other studies were on average more educated than the mothers in the current study.[56,57] It may be the low educational attainment in the current study that is causing the difference in results.

Similar to the model examining externalizing problems, caregiver depression, as measured by the CESD, was associated with higher ratings of internalizing behaviors at age eight. A previous study has found a comparable association between maternal depression (both past and current) and internalizing behaviors as rated on the CBCL.[28] It is possible that there is the same depression-bias occurring in the ratings of internalizing problems as there could be in the ratings of externalizing problems. However, another study found that children of parents with depression are more likely to be diagnosed with depression and anxiety disorders than children of parents who do not have

depression.[58] This suggests that there is not just an issue of respondent bias occurring, but that the children of caregivers with depression are more likely to experience internalizing symptoms themselves.

Limitations

There are several limitations to the current study. The first is that the sample is a non-probability, convenience sample. Children in this secondary data analysis were recruited to be in the larger LONGSCAN study because they met certain eligibility criteria, namely, they were at risk of maltreatment, had been maltreated, or could serve as a matched control for the study. These children and their families may not be representative of the general population of poor and near-poor families, therefore limiting the generalizability of the current findings. Even though Mplus utilizes Maximum Likelihood estimation, and therefore utilizes the whole sample, there was also a large amount of missing data for the academic performance outcome. Children with missing academic performance data were not significantly different from children without missing data, except for race at ages twelve and fourteen and maternal age at age eight. Another limitation is that in all three of the analyses (academic performance, internalizing behaviors, and externalizing behaviors) there was a large amount of variability that was not accounted for by the model. This indicates that while the models fit the data well, there were omitted variables. The current study only included time invariant covariates, however many of the covariates: such as maternal depression, income-to-needs ratio, marital status, and neighborhood quality can fluctuate over time. There may have been a lot of unexplained variability in the models because the instability of these factors was ignored. Future studies should include time varying covariates to see the role these fluctuations play in the child's development. Additionally, to further examine the role of experiencing physical neglect among poor children, future studies may want to consider physical neglect as a mediator between poverty and developmental outcomes, or as a mediator between caregiver education or depression and developmental outcomes.

Implications of findings

The current findings indicate that experiencing physical neglect decreases the academic performance of impoverished children. Furthermore, living in a higher quality neighborhood was shown to be associated with higher academic performance. While physical neglect was not found to be associated with an increase in externalizing or internalizing problems in this impoverished sample, caregiver depression was associated with higher externalizing and internalizing problems and maternal education was associated with more internalizing symptoms. These factors provide an opportunity to improve the developmental outcomes of children living in poverty.

Physical neglect was associated with lower scores on academic performance at age eight. This highlights the need to prevent physical neglect in order to improve the academic outcomes of elementary school children. Nurse home visiting programs that enroll women during pregnancy and continue through the child's infancy have been shown to have long term effects on the reduction of child maltreatment.[59,60] Funding for such programs should be increased so that more children can benefit from them. Doing so would not only improve the academic performance of children, but would also improve the immediate health and safety of children who would otherwise experience physical neglect.

The current study also determined that poor children who live in higher quality neighborhoods perform better academically than poor children who live in lower quality neighborhoods. Given that living in a nicer neighborhood appears to be protective, it is important to increase affordable housing in more affluent neighborhoods. This could be done through subsidized housing or through US Department of Housing and Urban Development programs (HUD). As a way to improve the lives of children and improve the academic outcomes of impoverished children, HUD should be sure to provide affordable housing in higher quality neighborhoods, not just in poor neighborhoods, through their programs. It is also important to increase access to libraries, afterschool programs, and high-quality teachers among children living in poverty.

Caregiver depression, according to the CESD, was also shown to be associated with negative developmental outcomes of children, namely internalizing and externalizing problems. While depression can interfere greatly with functioning and daily life, it is a highly treatable condition.[61] One

way to improve the internalizing and externalizing behaviors among children living in poverty would be to identify mothers/caregivers who are experiencing depression and provide them with treatment. Physicians or nurses could identify caregivers with depression during routine appointments. Screening tools have been developed for use in primary care settings and most have been found to be effective in recognizing mothers who are struggling with depression.[62] Identification and treatment of maternal depression among those living in poverty may improve the developmental outcomes of children living in poverty.

Summary

A within poverty analysis of the effect of neglect on the academic performance, as well as the internalizing and externalizing behaviors of children, indicates that physical neglect has a detrimental affect on the academic performance of impoverished children. No associations between physical neglect and the internalizing and externalizing behaviors of children living in poverty were found in controlled analyses. Other influences on academic performance and internalizing and externalizing behaviors were identified, namely neighborhood quality, caregiver depression, and maternal education. These findings indicate many opportunities to improve the development of children living in poverty, as well as children who have experienced physical neglect.

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TABLE 3-1. *Correlation Matrix: Physical Neglect Items from About My Parents.*

	Parents gave enough to eat	Parents kept house clean	Parents gave enough clothes to keep warm	Parents had something to eat when hungry	Parents left home alone after dark	Parents left home alone during day	Parents made sure bathed regularly
Parents gave enough to eat	**1.0**						
Parents kept house clean	0.37182 <.0001	**1.0**					
Parents gave enough clothes to keep warm	0.61582 <.0001	0.43554 <.0001	**1.0**				
Parents had something to eat when hungry	0.62575 <.0001	0.45943 <.0001	0.62917 <.0001	**1.0**			
Parents left home alone after dark	-0.11032 0.0171	-0.11669 0.0114	-0.1239 0.0072	-0.10366 0.0248	**1.0**		
Parents left home alone during day	-0.05397 0.2444	-0.09486 0.0400	-0.08913 0.0535	-0.07234 0.1177	0.61742 <.0001	**1.0**	
Parents made sure bathed regularly	0.38687 <.0001	0.32142 <.0001	0.36368 <.0001	0.25861 <.0001	-0.08873 0.0551	-0.14827 0.0013	**1.0**

TABLE 3-2. *Sample Characteristics for Academic Performance Analysis: Categorical Variables.*

Variable	**Percentage (n)**
Race	
White	22.5 (99)
Black	59.4 (262)
Hispanic	7.3 (32)
Native American	.68 (3)
Multi-Racial	9.5 (42)
Other	.68 (3)
Relationship to child	
Biological mother	92.9 (367)
Grandmother	3.3 (13)
Stepmother	.51 (2)
Other female rel.	1.0(4)
Foster mother	.76 (3)
Other female	0 (0)
Biological father	1.0 (4)
Other male	.51 (2)
Relationship status	
No Mate	51.8 (206)
Married	28.4 (113)
Partner	19.9 (79)
Female	54.9 (242)
Caregiver depression	31.1 (137)
Physical neglect	64.2 (201)

TABLE 3-3. *Sample Characteristics for Academic Performance Analysis: Continuous Variables.*

Variable	Mean	SD	Range
Income-to-needs ratio	.76	.48	.09– 1.98
Maternal education	11.2	1.8	4 - 16
Neighborhood quality	2.6	.91	1 - 4
Academic Performance			
Age 8	253.4	94.8	100-500
Age 12	241.4	93.7	100-500
Age 14	260.70	93.1	100-500

TABLE 3-4. *Sample Characteristics for Internalizing and Externalizing Analyses: Categorical Variables.*

Variable	**Percentage (n)**
Race	
White	16.1 (112)
Black	71.7 (499)
Hispanic	4.7 (33)
Native American	.43 (3)
Multi-Racial	6.3 (44)
Other	.72 (5)
Relationship to child	
Biological mother	91.6 (555)
Grandmother	3.8 (23)
Stepmother	.33 (2)
Other female rel.	1.5 (9)
Foster mother	.66 (4)
Other female	.17 (1)
Biological father	1.7 (10)
Other male	.33 (2)
Relationship status	
No Mate	55.5 (336)
Married	23.3 (141)
Partner	21.3 (129)
Female	51.7 (360)
Caregiver depression	30.3 (211)
Physical neglect	62.8 (317)

TABLE 3-5. *Sample Characteristics for Internalizing and Externalizing Analyses: Continuous Variables.*

Variable	**Mean**	**SD**	**Range**
Income-to-needs ratio	.73	.48	.09– 1.98
Maternal education	11.3	1.7	4 - 16
Neighborhood quality	2.6	.90	1 - 4
Internalizing behavior			
Age 8	6.1	5.9	0-40
Age 12	6.8	6.5	0-35
Age 14	6.5	6.7	0-32
Externalizing behavior			
Age 8	10.9	8.5	0-45
Age 12	10.4	9.0	0-57
Age 14	6.8	6.5	0-54

TABLE 3-6. *LCM results: Outcomes of experiencing physical neglect.*

Model						
	Academic Performance		**Externalizing Behavior**		**Internalizing Behavior**	
Parameter	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Intercept						
Neglect	-44.9	12.7*	0.961	0.79	0.64	0.54
Maternal education	3.6	3.4	-0.304	0.22	-0.29	0.16
Caregiver depression	-0.6	12.3	1.80	0.76***	1.4	0.53**
No mate	-4.2	16.5	-0.729	0.94	-0.15	0.65
Married	22.1	18.5	-0.623	1.2	0.13	0.80
Income-to-needs ratio	7.7	12.7	-0.103	0.83	0.47	0.58
Neighborhood quality	18.7	6.95**	-0.774	0.45	-0.27	0.31
Midwestern Site	-0.06	11.96	0.703	0.86	-0.77	0.60
Eastern Site	NA	NA	-2.06	0.88	-1.5	0.61
Slope						
Neglect	17.9	9.3[+]	0.329	0.46	0.12	0.35
Maternal education	-0.6	2.5	0.270	0.13***	0.16	0.10
Caregiver depression	2.98	9.2	0.859	0.45†	0.56	0.33
No mate	-4.1	12.4	-0.107	0.58	-0.28	0.41
Married	-8.2	14.2	-0.445	0.71	-0.40	0.51
Income-to-needs ratio	0.2	9.7	-0.081	0.51	-0.39	0.37
Neighborhood quality	-3.2	5.2	0.075	0.27	-0.25	0.19
Midwestern Site	-3.8	8.9	-0.750	0.51	-0.58	0.37
Eastern Site	NA	NA	-0.792	0.52	-0.32	0.39
Covariance						
Intercept-slope	-1235.1	759.8	-0.054	2.8	-1.2	1.55
Residual variances						
Age 8	2674.8	1218.9***	26.5	4.8*	14.7	2.7*
Age 12	4116.0	672.9*	22.7	2.6*	16.9	1.6*
Age 14	1169.5	1332.7	7.9	5.5	5.96	3.0***
Intercept	4853.1	1261.5*	43.7	5.2*	18.9	2.7*
Slope	1745.7	688.7**	11.1	2.8*	5.4	1.5*
Fit Indices						
χ^2	5.2; p=.82	---	12.0; p=.28	---	20.3;p=.03	---
CFI	1.0	---	.997	---	.98	---
TLI	1.12	---	.990	---	.93	---
RMSEA	.000	---	.017	---	.038	---
SRMR	.017	---	.008	---	.014	---

*** Significant at p<0.01 * Significant at p<.0001
** Significant at p<.05 † p<0.057
[+] p=0.054

TABLE 3-7. *Differences between those missing academic performance data and those not missing academic performance data.*

	Not Missing Academic Performance Data			**Missing Academic Performance Data**		
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Caregiver education						
Age 8	212	11.321	1.731	184	11.152	1.85
Age 12	148	11.378	1.732	248	11.161	1.82
Age 14	140	11.179	1.867	256	11.277	1.75
Income-to-needs ratio						
Age 8	209	.793	.520	180	.721	.431
Age 12	146	.742	.499	243	.771	.471
Age 14	137	.764	.488	252	.758	.479
Maternal age						
*Age 8**	197	21.868	5.55	169	23.444	5.80
Age 12	138	22.203	6.14	228	22.833	5.44
Age 14	127	22.04	5.999	239	22.891	5.55

	% (N)	**% (N)**	**χ^2**
Gender Age 8			.0001
Male	45.11 (106)	45.15 (93)	
Female	54.89 (129)	54.85 (113)	
Gender Age 12			.0254
Male	45.63 (73)	44.63 (126)	
Female	54.38 (87)	55.16 (155)	
Gender Age 14			1.8719
Male	40.76 (64)	47.54 (135)	
Female	59.24 (93)	52.46 (149)	
Race Age 8			p=.0927
White	23.83 (56)	20.87 (43)	
Black	62.13 (146)	56.31 (116)	
Hispanic	6.38 (15)	8.25 (17)	
Native American	.85 (2)	.49 (1)	
Multi-Racial	6.81 (16)	12.62 (26)	
Other	0 (0)	1.46 (3)	
Race Age 12*			p=.0206
White	23.13 (37)	22.06 (62)	
Black	66.88 (107)	55.16 (155)	
Hispanic	3.75 (6)	9.25 (26)	
Native American	.63 (1)	.71 (2)	
Multi-Racial	5.63 (9)	11.74 (33)	
Other	0 (0)	1.07 (3)	
Race Age 14*			p=.0156
White	17.83 (28)	25.0 (71)	
Black	69.43 (109)	53.87 (153)	
Hispanic	3.82 (6)	9.15 (26)	
Native American	0 (0)	1.06 (3)	
Multi-Racial	8.92 (14)	9.86 (28)	
Other	0 (0)	1.06 (3)	

* Statistically significant at p<.05 ** Statistically significant at p<.01

CONCLUSION

An examination of the within poverty differences of the occurrence and developmental outcomes of physical neglect revealed notable findings. Children living in poverty whose caregivers' scores on the CESD indicate depression are more likely to experience physical neglect than poor children whose caregivers' scores did not indicate depression. Neighborhood quality was related with the occurrence of physical neglect; impoverished children in lower quality neighborhoods were more likely to be physically neglected than poor children in higher quality neighborhoods. Poor children whose caregivers have a self-reported history of physical or sexual abuse were more likely to experience physical neglect than impoverished children whose caregivers did not report experiencing abuse. In this impoverished sample, experiencing physical neglect was associated with poor academic performance at age eight, although the academic performance of poor children who were neglected did improve over time compared to poor children who were not neglected. Living in a higher quality neighborhood was academically protective for impoverished children, whether they had experienced physical neglect or not. In this dissertation there were not within poverty differences in the externalizing or internalizing behaviors of poor children who were physically neglected compared to poor children who were not physically neglected. While physical neglect did not have a differential effect on internalizing and externalizing behaviors in this impoverished sample, other within poverty differences in internalizing and externalizing behaviors were identified. Poor children whose caregivers had depression were more likely to display internalizing and externalizing problems at age eight than poor children whose caregivers did not have depression. The externalizing behaviors of poor children whose caregivers have more education increase slightly more steeply than children whose caregivers have less education.

Two themes can be drawn from the findings of this dissertation. Caregiver depression and living in a lower quality neighborhood have detrimental effects on impoverished children. These two themes lend themselves to inform policy and practice changes to improve the lives of children living in

poverty. The other significant findings of the two papers in this dissertation: a caregiver's history of maltreatment increasing the risk of physical neglect for poor children, the association between caregiver education and increasing externalizing behaviors in impoverished children, and physical neglect's association with low academic performance among poor children, can also inform policy and practice. These implications have also been reviewed in each of the separate papers that comprise this dissertation.

Caregiver depression is clearly detrimental for children. Previous research has demonstrated the maternal depression has a negative impact on a wide range of child factors beyond what was examined in this dissertation, such as the social engagement, regulatory behaviors, and negative emotionality of infants,[1] activity level in children ages four to six, [2] and childhood injuries.[3] Given the negative influence caregiver depression can have on many aspects of an impoverished child's life, it is important to find a way to ameliorate this problem. Depression is a highly treatable condition.[4] It is important to identify caregivers who are struggling with depression and help them receive treatment. Given that infants and young children receive numerous well baby visits, pediatricians could play an important role in the identification of depression among low-income caregivers and refer them to mental health treatment. Screening tools have been developed for use in primary care settings and most have been found to be effective in recognizing mothers who are struggling with depression.[5] Pediatricians could use these screeners on the caregivers of their low-income patients in order to determine if the caregiver is struggling with depression. Identification and treatment of maternal depression among those living in poverty may decrease the risk of physical neglect occurring, as well as decrease the externalizing and internalizing behaviors displayed by the children living in poverty. However, pediatricians aren't always comfortable assessing depression in their patients' caregivers, and subsequently referring them to treatment if necessary.[6] Pediatric residency programs should emphasize how to discuss depression with the caregivers of low-income patients, as well as how to identify depression in their caregivers and proper referral protocols.

Living in a higher quality neighborhood was protective for impoverished children, specifically with regards to experiencing physical neglect and the academic performance of children. Other studies have found indicators of neighborhood poverty to be associated with wide range of poor child

outcomes, such as mortality risk among infants with complex chronic conditions,[7] dental caries,[8] and school crime.[9] Increasing affordable housing in better quality neighborhoods would help low-income families rent or own housing in such neighborhoods. This could reduce the negative outcomes for poor children associated with living in lower quality neighborhoods.

Child who live in poverty and have a caregiver who has a history of physical and sexual abuse are more likely to be physically neglected than poor children whose caregivers do not have a history of maltreatment. This highlights an opportunity to provide a targeted intervention among poor families in order to prevent physical neglect from occurring. It has been suggested that intergenerational transmission of child maltreatment occurs because child maltreatment results in insecure attachment styles and this insecure attachment style is represented within the child as an internal working model. An individual who has been maltreated uses this insecure working model as an archetype for future relationships.[10] Therefore, a caregiver who has an insecure attachment style will be unable to form a secure attachment with her own children[11] and may be at-risk of maltreating them as a result.[10,12] It is the parent-child relationship that is transmitted between the generations, not necessarily child maltreatment.[10] There are several interventions that are effective in improving maternal sensitivity and attachment[13] and therefore may reduce the likelihood that a mother living in poverty who has experienced maltreatment herself will maltreat her child. Poor mothers who were physically or sexually abused as children could be referred to these intervention programs in order to reduce the likelihood that they will physically neglect their own children.

Impoverished children who experience physical neglect perform worse academically at age eight than poor children who were not physically neglected. This highlights the need to prevent physical neglect in order to improve the academic outcomes of impoverished children. Nurse home visiting programs that enroll women during pregnancy and continue through the child's infancy have been shown to have long term effects on the reduction of child maltreatment.[14,15] Funding for such programs should be increased so that more impoverished children can benefit from them. Doing so would not only improve the academic performance of poor children, but would also improve the immediate health and safety of children who would otherwise experience physical neglect.

This dissertation did not find that poor children who experience physical neglect display more internalizing or externalizing behaviors than impoverished children who were not physically neglected. However, there was a lot of variability in both analyses that was not explained by the models, which indicates that there were variables omitted from the models. The current dissertation only included time invariant covariates; however, many of the covariates, such as maternal depression, marital status, and neighborhood poverty can fluctuate over time. There may have been a lot of unexplained variability in the models because the instability of these factors was ignored. Future studies should include time varying covariates to see the role these fluctuations play in the development of impoverished child.

Child maltreatment and child poverty are significant public health problems in the United States. The findings of this dissertation identify many opportunities to improve the lives of children living in poverty. Alleviating caregiver depression, increasing affordable housing in higher quality neighborhoods, preventing neglect, and improving the attachment styles between caregivers who have experienced abuse and their children are all means to enhance the development and health of impoverished children.

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