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Early childhood aggression among child welfare involved children: The interplay between the type of child maltreatment and ecological protective factors

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ABSTRACT

The current study examined four types of maltreatment (i.e., physical, sexual, emotional, neglect) and ecological protective factors (i.e., child prosocial skills, parental warmth, parental well-being, neighborhood safety) as predictors of aggressive behavior among young children in the child welfare system. Further, this study explored interaction effects between maltreatment types and protective factors on early childhood aggression. Ordinary least squares (OLS) hierarchical multiple regression was performed on a sample of 499 children (ages 4–5) drawn from the National Survey of Child and Adolescent Well-Being (NSCAW-I). Physical abuse was associated with higher levels of early childhood aggression whereas living in a neighborhood with fewer problems was associated with lower levels of aggression. Novel interaction effects also emerged; the protective effects of child prosocial skills and parental well-being on aggression were significantly stronger in emotionally abused children than in children who were not emotionally abused. The findings suggest that interventions that address both the type of maltreatment and ecological protective factors may be effective in reducing early childhood aggression among at-risk children.

1. Introduction

Although the link between child maltreatment and childhood aggression has been well established (Reidy, 1977), the role of particular subtypes of maltreatment remains unclear. A developmental psychopathology framework (Cicchetti & Toth, 1995) suggests that various maltreatment experiences, such as "nature [e.g., type] of the experience" may have differential impact on outcomes, highlighting the need for consideration of different types of maltreatment experienced by children. Additionally, this framework underscores the interactions of risk and protective factors across multiple levels that influence children's developmental outcomes (Sroufe & Rutter, 1984). Although prior research has identified various protective factors for aggression (Vanderbilt-Adriance et al., 2015), few studies have examined multi-level protective factors across the social ecology, especially in conjunction with maltreatment subtypes, to understand their relations with childhood aggression. The present study seeks to address some of these gaps by 1) examining maltreatment types and multi-level (i.e., individual-, relationship-, community-level) protective factors as predictors of early childhood aggression and 2) exploring interaction effects between maltreatment types and protective factors among a sample of children involved with the child welfare system.

1.1. Early childhood maltreatment

Child maltreatment continues to be one of the major social problems in the United States. Maltreatment is defined as any recent act (or failure to act) by a caregiver which presents an imminent risk of serious physical, sexual, or emotional harm; or leads to death, serious physical or emotional harm, sexual abuse or exploitation (U.S. Department of Health and Human Services [US DHHS], 2017). In 2015, 3.4 million referrals were made to Child Protection Services (CPS) agencies for investigation of alleged maltreatment and approximately 9 per 1000 children (i.e., 683,000) were found to be victims of child maltreatment (US DHHS, 2017). Of those victims, three quarters (75.3%) were neglected, 17.2% were physically abused, 8.4% were sexually abused, and 6.2% were emotionally abused (US DHHS, 2017). Maltreatment at an early age (≤ 5 years) is of serious concern as this is a period of extreme vulnerability in which children are most likely to experience maltreatment with severe consequences. Rates of maltreatment generally decline with age, suggesting that young children are more vulnerable to maltreatment than older children (Wulczyn, Barth, Yuan,

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Harden, & Landsverk, 2005). According to the 2012 annual census of children referred to child welfare services, approximately half (46.7%) of victims were in the age group of 0–5 years (US DHHS, 2013). The victimization – defined here as instances of substantiated or indicated maltreatment, and/or death from abuse and neglect – rate was highest for children in infancy or toddlerhood (i.e., birth to age 3), followed by children in early childhood (for the purpose of this study, early childhood is defined as the period from 4 to 5 years of age). In 2015, victims aged 4and 5 years had victimization rates of 10.3 and 10.5 victims per 1000 children respectively in the population of the same ages, indicating that a substantial number of children in early childhood are affected by child maltreatment (US DHHS, 2017). Early childhood maltreatment is a serious concern because it interrupts normal development. Children who are maltreated during the early years of their lives experience negative developmental outcomes across multiple domains (Cicchetti, 2016; Norman et al., 2012). For example, maltreated preschoolers tend to develop language more slowly, have less self-control and poorer emotional regulation, and exhibit more aggressive behaviors compared to non-maltreated children (Font & Berger, 2015;Messman-Moore & Bhuptani, 2017; Widom, 2014).

1.2. Maltreatment types and aggressive behavior

Children who experience maltreatment are at a greater risk of developing aggressive behavior than non-maltreated children (Anthonysamy & Zimmer-Gembeck, 2007; Holmes, 2013; Holmes, Yoon, Voith, Kobulsky, & Steigerwald, 2015; Manly, Kim, Rogosch, & Cicchetti, 2001; Shackman & Pollak, 2014; Teisl & Cicchetti, 2008). In a nationally representative study of children investigated for alleged child maltreatment, more than one third of children aged 4 to 5 years displayed borderline or clinical levels of externalizing behavior problems, including aggressive and disruptive behaviors (Wulczyn et al., 2005). Aggression can be broadly defined as intentional acts or behaviors aimed at physically, psychologically, or relationally harming others or objects (Kempes, Matthys, de Vries, & van Engeland, 2005) and may include various forms including hostile (overt, direct) and relational (covert, instrumental, indirect) aggression. In the current paper, we focus on overt aggression, which refers to direct physical and verbal aggressive behaviors intended to hurt others (Peled & Moretti, 2007). Aggressive behavior in early childhood is often viewed as normative behavior, with only a small sub-group of children following the path of a life-persistent pattern of aggressive behavior (Dodge, Coie, & Lynam, 2006; Heilbron & Prinstein, 2008; Moffitt, 1993). However, empirical evidence also suggests early childhood aggressive behavior may be an important marker for life-course persistent antisocial behavior (Moffitt, 1993), and it is important to identify early risk and protective factors for aggression to offer early intervention services at one of the most critical periods in a child's development.

Both theoretical (e.g., developmental psychopathology) and empirical evidence (e.g., Manly et al., 2001) suggests the importance of examining the distinctive effects of different types of maltreatment. Drawing from developmental psychopathology that emphasizes the nature of the experience (Cichhetti, & Toth, 1995), different maltreatment types will have different impact on childhood aggressive behavior. Child physical abuse and its relation to aggression have received the most theoretical and empirical attention. Building on social learning theory (Bandura, 1978), physically abused children are likely to exhibit aggressive behavior through their “observation” and “modeling” of violent behavior. Empirical research has consistently supported this idea via findings of a strong association between child physical abuse and externalizing behaviors, such as aggressive and disruptive/delinquent behaviors (Bennett et al., 2005; Manly et al., 2001; Shackman & Pollak, 2014; Teisl & Cicchetti, 2008). There is also a substantial body of literature suggesting a link between sexual abuse and aggressive behavior in childhood (e.g., Browne & Finkelhor, 1986; Paolucci, Genuis, & Violato, 2001). However, relatively less attention has been paid to the relation between other forms of maltreatment (i.e., emotional abuse, neglect) and aggressive behavior, especially for younger children (e.g., preschool aged children). Attachment theory (Bowlby, 1969) posits that responsive parenting and secure parent-child relationships are vital sources for children's emerging emotional regulation skills and relational behavior. Drawing from this theory, emotionally abused and neglected children whose caregivers are often unable to provide sensitive or responsive care may be at risk for emotional dysregulation, which is closely related to aggressive behavior (Burns, Jackson, & Harding, 2010; Kim & Cicchetti, 2010; Manly, Oshri, Lynch, Herzog, & Wortel, 2013). Therefore, it is important to examine how child emotional abuse and neglect may be associated with early childhood aggression.

1.3. Ecological protective factors and aggressive behavior

Bronfenbrenner's bioecological theory of human development emphasizes the importance of understanding human development as a result of interactions between an individual and his or her surrounding context across multiple-levels of the social ecology (Bronfenbrenner, 2005). Drawing from this theory, various personal (i.e., individual level) and contextual (e.g., relational level, community level) protective factors may buffer the negative effects of maltreatment on aggressive behavior.

At the individual level, studies have suggested high cognitive abilities, such as verbal and nonverbal intelligence, as a protective factor that promote positive behavioral outcomes in children who have experienced early adversity (Herrenkohl, Herrenkohl, Rupert, Egolf, & Lutz, 1995; Teisl & Cicchetti, 2008). Higher cognitive abilities (e.g., higher IQ), for instance, have been associated with better behavioral outcomes among maltreated children in middle childhood (Herrenkohl et al., 1995; Teisl & Cicchetti, 2008). Child prosocial behavior, defined as voluntary behavior intended to benefit another person (Eisenberg, 1982) (e.g., empathy, sharing, cooperation) is another individual-level protective factor against the negative impact of maltreatment. Although prosocial behavior and aggression may be perceived as opposite ends of a single concept, empirical research has suggested that these are two independent characteristics of the individual (Kokko, Tremblay, Lacourse, Nagin, & Vitaro, 2006). For example, studies have found distinct correlates and etiologies of prosocial behavior and aggression (Krueger, Hicks, & McGue, 2001).

At the relationship level, maternal warmth has been linked to less aggressive behavior among maltreated children (Holmes, 2013; Lansford et al., 2014). Both theoretical (e.g., attachment theory: Bowlby, 1969) and empirical evidence (e.g., Skopp, McDonald, Jouriles, & Rosenfield, 2007) has suggested that warm and caring parents may protect their child from developing behavior problems (e.g., aggressive behavior) by providing the secure base on which the child develops trust and socially adaptive skills to relate to others. Parental well-being (i.e., absence of mental and substance use disorders) has also been identified as an important protective factor for aggression in maltreated children (Holmes et al., 2015; Jaffee, Caspi, Moffitt, Polo-Tomas, & Taylor, 2007; Manly et al., 2013; Rakow, Smith, Begle, & Ayer, 2011).

At the community level, neighborhood factors, including neighborhood socioeconomic status, safety, and a sense of belonging, have also been found to have significant influence on children's behavioral outcomes (Leventhal & Brooks-Gunn, 2000; Singh & Ghandour, 2012). Neighborhood safety, for example, has been associated with fewer aggressive and delinquent behaviors in maltreated children (Lansford et al., 2006). However, studies that have investigated neighborhood effects on children's outcomes have mainly focused on late childhood and adolescence rather than early childhood, presumably because adolescents spend more time with peers in the neighborhood and have more neighborhood contact compared with young children. Further research is needed on the protective role of neighborhood safety in

early childhood aggression among young maltreated children.

1.4. Interaction effects between child maltreatment and protective factors

Some studies have suggested possible interaction effects between child maltreatment and protective factors on children's aggressive behavior. For example, Deater-Deckard et al. (2006) found that maternal warmth moderated the influence of harsh discipline on externalizing behavior problems (i.e., aggression, disruptive behavior) in children ages 3 to 8 years. Specifically, the association between harshness of discipline and child externalizing behavior problems was weakest in children with high maternal warmth. Yonas et al. (2010) reported significant interaction effects between child maltreatment and neighborhood factors (e.g., social cohesion, collective efficacy) on aggressive behavior in 823 children aged 12. Children who experienced neglect had less aggression when they lived in neighborhoods with higher levels of collective efficacy. Despite preliminary evidence for interactions between child maltreatment and protective factors on child aggressive behavior, the interaction between maltreatment type (i.e., physical abuse, sexual abuse, emotional abuse, and neglect) and ecological protective factors on early childhood aggressive behavior has yet to be examined.

1.5. The present study

Both developmental psychopathology (Sroufe & Rutter, 1984) and Bronfenbrenner (2005)'s theory emphasize the interplay between risks and protections in influencing child outcomes. The present study aims to fill the gaps in our knowledge on how different types of maltreatment and ecological protective factors may predict aggression in early childhood, either separately or in conjunction with each other. The following research questions are addressed: 1) how is the type of maltreatment related to early childhood aggression among children in the child welfare system? It was hypothesized that all four types of maltreatment (i.e., physical abuse, sexual abuse, emotional abuse, neglect) would be associated higher levels of aggression.; 2) how are protective factors across the social ecology associated with early childhood aggression? It was hypothesized that individual (i.e., cognitive abilities, prosocial behavior), relationship (parental warmth, parental well-being), and community (i.e., neighborhood safety) –level protective factors would be associated with lower levels of early childhood aggression; and 3) are there significant interaction effects between maltreatment type and protective factors on early childhood aggression? Given the exploratory nature of the question and limited findings from prior research, no specific hypotheses regarding interaction effects were formulated.

2. Methods

2.1. Sample

This study used data from the National Survey of Child and Adolescent Well-Being (NSCAW-I). NSCAW-I is a nationally representative longitudinal survey that collected data from children and families involved in the child welfare system through the United States (Dowd et al., 2008). The original NSCAW-I cohort includes 5501 children who were between 0 and 14 years old and who had contact with Child Protective Services (CPS) between October 1999 and December 2000. Data were collected through interviews with children, current caregivers, teachers, and caseworkers at five time points: 2–6 months (Wave 1), 12 months (Wave 2), 18 months (Wave 3), 36 months (Wave 4) and 59–96 months (Wave 5) after the close of investigation for child abuse and neglect (Dowd et al., 2008). The current study used data from the first wave of data collection and the subsample for this study included 499 children who were four or five years old at Wave 1 and who were not removed from the home (i.e., no out-of-home placement) after CPS investigation. We restricted our sample to children ages between 4 and 5 years at Wave 1 because the study focuses on maltreatment, protective factors and aggression in early childhood (defined as the period from 4 to 5 years of age). Both children with substantiated maltreatment reports and unsubstantiated maltreatment reports were included as study participants based on prior research which indicated no significant differences between unsubstantiated (i.e. maltreatment allegations) and substantiated reports as a predictor of child developmental outcomes (Kohl, Jonson-Reid, & Drake, 2009). Approximately 15% of the children received behavioral health services (interventions), yet receipt of services/interventions was not significantly related to any of the study variables in the current study. Therefore, both children with and without receipt of behavioral health interventions were included in the analysis. Children receiving out-of-home care services were excluded from the analysis because some key study variables (e.g., parental well-being) were not available for children in out-of-home care. Power analysis indicated that the minimum sample size to reject the hypothesis with a power of > 80% is estimated to be 208 subjects, suggesting that the current study's sample size of 449 had adequate power to detect the relationships among study variables.

All study variables had < 1% missing cases with the exception of the child cognitive ability variable, which had the most missing cases (12.5% missing cases; $n = 56$). Little's MCAR test indicated that data were missing completely at random ($\chi^2 = 70.732$, df = 53, $p = 0.052$). Missing data were handled using the multiple imputations module in SPSS v. 23, with 25 fully imputed datasets and fully conditional specification method, which uses an iterative Markov Change Monte Carlo (MCMC) method.

2.2. Measures

2.2.1. Aggressive behavior

Aggressive behavior was measured using the aggressive behavior scale of the Child Behavior Checklist for children age 4–18 (CBCL/4–18; Achenbach, 1991), a caregiver-rating of the child's emotional, behavioral, and social problems during the past 6 months. Caregivers rated their child the 20 items of the aggressive behavior scale (e.g., screams a lot; gets in many fights; destroys things belonging to his/her family or other children), using a 3-point response scale; 0 = *not true,* 1 = *somewhat or sometimes true*, 2 = *very true or often true*. Raw scores were converted into age- and gender- adjusted standardized *T*-Scores, with higher scores indicating more aggressive behavior. *T* -scores < 67 are considered to be in the normal rage, 67–70 in the borderline clinical range, and above 70 in the clinical range (Achenbach, 1991). Cronbach's α for Aggressive Behavior Scale in the study sample was 0.97.

2.2.2. Child maltreatment type

The type of maltreatment experienced by the child was assessed using CPS reports of maltreatment and the Parent-Child Conflicts Tactic Scale (CTS-PC; Strauss, Hamby, Finkelhor, Moore, & Runyan, 1998). The CTS-PC was reported by the child's parent and assessed the frequency and extent of specific acts of physical abuse (i.e., severe and very severe physical assault subscales; 8 items: e.g., kicked the child, beat the child; α:0.40), sexual abuse (2 items; forced sexual intercourse, forced sexual contact; α:0.44), emotional abuse (3 items; e.g., sworn or cursed at the child; α:0.70), and neglect (5 items; e.g., leave the child home alone; α: 0.46) during the past 12 months. The caregiver-reported maltreatment data were merged with CPS reports (0 = *no*, 1 = *yes*) of physical abuse, sexual abuse, emotional abuse, and neglect. For each type of maltreatment, the child was coded yes (1) if he or she had either a CPS-reported or parent-reported maltreatment incident. Four non-mutually exclusive binary variables (0 = *no*, 1 = *yes*) were created: physical abuse, sexual abuse, emotional abuse, and neglect.

2.2.3. Child cognitive ability

The Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman,

1990) is a 130-item (93 items for children < 8) measure of both verbal and nonverbal intelligence. The K-BIT consists of two subtests (Verbal and Matrices) administered to the participant by an interviewer. The participant is shown pictures on a tabletop easel and asked questions about them. The respondent is asked to point to the correct answer on the easel. The vocabulary subscale assesses word knowledge and verbal concept formation and the Matrices subscale assesses ability to perceive relationships and complete analogies. The scores from both subscales provide a composite IQ score (i.e., A Total Cognitive Ability score). Cronbach's α of the total cognitive ability scale in this study sample was 0.92. The standardized total cognitive ability scores were used, with higher scores indicating higher cognitive functioning.

2.2.4. Child prosocial skills

The Social Skills Rating System (SSRS; Gresham & Elliott, 1990) was used to measure the parent perception of the child's prosocial skills (i.e., self-control, assertion, responsibility, cooperation). Parents' responses (1 = *never*, 2 = *sometimes*, 3 = *very often*) on the 39 SSRS items were summed to create a total child prosocial skills scale. Good test-retest reliability (α = 0.87) and construct validity have been reported for the SSRS scale (Gresham & Elliot, 1990). Cronbach's α in this study sample was 0.90. The standardized child prosocial skills score was used, with higher scores indicating higher prosocial skills.

2.2.5. Parental warmth

Parental warmth was measured by the Early Childhood Home Observation for Measurement of the Environment (EC-HOME; Caldwell & Bradley, 1984). The EC-HOME contains 55 items that asses the home environment of children ages between 3 and 6 years. The current study used the parental warmth subscale (see Leventhal, Martin, & Brooks-Gunn, 2004 for more information) created using seven interviewer-observed items (e.g., caregiver conversed with child at least twice, caregiver usually responds verbally to child's speech, caregiver caressed, kissed, or hugged child at least once). Items were scored as 1 = *yes* (if present) or 0 = *no* (if not present) and summed to create a total parental warmth score (Cronbach's α = 0.68). The standardized caregiver warmth scores were used for this study, with higher scores indicating a higher level of parental warmth.

2.2.6. Parental well-being

Parental well-being was assessed based on three disorders (i.e., depression, alcohol dependence, drug dependence) measured by the Composite International Diagnostic Interview Short Form (CIDI-SF; Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). The CIDI-SF screens for mental health and substance use disorders using the Diagnostic and Statistical Manual of Mental Disorders–IV (DSM-IV; American Psychological Association, 1994). Based on the DSM-IV criteria for major depressive episode, depression was assessed by three screening questions (had feelings of being sad, blue, or depressed that lasted 2 or more weeks in the past year; felt sad, blue or depressed almost every day; had feelings of being sad, blue, or depressed that lasted at least half the day) and five symptom questions (weight change; trouble sleeping; difficulty concentrating; feelings of worthlessness; thoughts about death; Cronbach's α: 0.45). Responses were coded as follows: 0 = *had a major depressive episode in the past 12 months*, 1 = *felt depressed but had no major depressive episode in the past 12 months*, 2 = *did not feel depressed in the past 12 months*. Alcohol dependence was assessed by the largest number of drinks consumed in a single day during the past 12 months. Parents were coded as 0 = *heavy drinker* (> 10 drinks in one day), 1 = *moderate drinker* (four to ten drinks in one day), 2 = *light drinker* (three or fewer drinks in one day), or 3 = *abstainer* (no drinks in the past 12 months). Drug dependence was assessed by a screening question and seven symptoms questions (DSM-IV criteria for drug abuse and dependence; Cronbach's α: 0.83). Parents were coded as 0 = *drug dependent* (three or more drug dependence symptoms in the past 12 months), 1 = *drug user* (used at least 1 drug in the past year but had < 3 substance dependence symptoms in the past 12 months), and 2 = *abstainer* (no drug use in the past 12 months). A composite parental well-being score was calculated by summing the scores on the three disorder measures (major depression, alcohol dependence, drug dependence). Higher scores represent better parental well-being.

2.2.7. Neighborhood safety

Neighborhood safety was measured using the Abridged Community Environment Scale that was developed for use in the National Evaluation of Family Support programs (Furstenberg, 1990). The scale includes nine items that inquire about parents' perceived neighborhood characteristics. All items were reverse-coded so that higher scores represent positive attributes. To assess the dimensionality of the scale, an exploratory factor analysis (principal axis factoring) was performed with Varimax rotation. Two factors were retained and rotated. Factor 1 accounted for 30.24% of the variance and included five items representing current problems in the neighborhood (i.e., assaults and muggings, delinquency or drug gangs, open drug use or dealing, unsupervised children, groups of teenagers hanging out in public places). Factor 2 accounted for 21.10% of the variance and included four items representing relative neighborhood safety and quality of life compared with other neighborhoods (i.e., neighborhood safety, neighbors help each other, involvement of parents, good place to live compared with other neighborhoods). Based on the factor analysis results, two subscales were created and used: subscale 1- fewer problems in the neighborhood (Cronbach's α = 0.84); subscale 2- relative neighborhood safety (Cronbach's α = 0.75).

2.2.8. Control variables

Child's age, gender (0 = *male*, 1 = *female*), race (White, Black, Hispanic, Others), Parental education (0 = *high school degree or less*, 1 = *more than high school*) were reported by the parent. Race was dichotomized (0 = Non-Black, 1 = Black) based on previous studies that found higher levels of early childhood aggression in Black children (e.g., Lansford et al., 2006).

2.3. Analysis plan

Univariate frequencies and descriptive statistics (M, SD, minimum, maximum, skewness, and kurtosis) were computed to understand the descriptive characteristics of the sample. Bivariate correlations between each predictor and the outcome were computed to examine bivariate relationships between study variables and to check multicollinearity. Correlation above 0.80 was considered as a warning sign for multicollinearity (Allison, 1999). Multicollinearity among predictors was also checked by Tolerance. Tolerance < 0.4 indicates some potential violation of multicollinearity (Allison, 1999). Continuous variables were mean-centered prior to entering in the regression model to reduce multicollinearity and facilitate interpretation. Un-centered variables were used for univariate and bivariate analyses and mean-centered predictors were used for multivariate analyses.

Ordinary least squares (OLS) hierarchical multiple regression was conducted using SPSS V.23 to regress early childhood aggression on maltreatment type and ecological protective factors, while controlling for covariates, including child demographics. In addition, interaction effects between maltreatment type and protective factors on aggression were explored by including interaction terms (i.e., each maltreatment type x each protective factor). Nonsignificant interaction terms were removed from the final model (Engqvist, 2005). Control variables were entered first (Model 1), followed by the type of maltreatment (Model 2), protective factors (Model 3), and interaction terms (Model 4).

Table 1
Descriptives of study variables (N = 447).

	M (SD)/%	Range (Min-Max)
Child Aggressive behavior	59.34 (9.91)	50 – 98
Child age	4.45 (0.50)	4 – 5
Child gender_female	48.00	–
Child race		
White	50.20	–
Black	24.80	–
Hispanic	19.30	–
Other	5.70	–
Parental education_more than high school	22.00	–
Physical abuse	34.00	–
Sexual abuse	23.00	–
Emotional abuse	47.00	–
Neglect	69.00	–
Child cognitive skills	93.67 (14.26)	43 – 132
Child prosocial skills	92.36 (15.63)	52 – 130
Parental well-being	5.25 (1.63)	0 – 7
Parental warmth	50.13 (9.96)	23 – 59
Less neighborhood problems	13.26 (2.50)	5 – 15
Relative neighborhood safety	8.63 (2.30)	2 – 12

3. Results

3.1. Univariate descriptives and bivariate correlations among study variables

Table 1 presents sample characteristics and descriptive statistics of main study variables.

A little over half of the sample was four years old (54.8%) and the remaining children were 5 years old. Approximately half of the children were male (51.7%). A half of the sample was White, one quarter of the sample (24.8%) was Black, about 20% was Hispanic and the remaining 6% was Other. Twenty-two percent of the parents had more than a high school education. A little less than one-third (28.95%) of the sample has experienced some form of substantiated maltreatment. Approximately 20% of children exhibited borderline (9%) or clinical (11%) levels of aggressive behavior. Early childhood aggressive behavior was positively associated with physical abuse, emotional abuse, and neglect, but was negatively associated with child prosocial skills, parental well-being, and fewer neighborhood problems. Table 2 shows bivariate correlations.

3.2. Predictors of early childhood aggressive behavior

Hierarchical OLS multiple regression results for early childhood aggressive behavior are summarized in Table 3. Bivariate correlations as well as Tolerance value of each predictor among predictors indicated no signs of multicollinearity. Model 1, with sample demographics (control variables) as a set of predictors, was not statistically significant, F (4, 442) = 0.580, p = 0.677. The demographic characteristics explained only 1% of variance in aggressive behavior and none of the predictors were statistically significant.

When maltreatment type variables were added in Model 2, Model 2 was statistically significant, F (8, 438) = 5.778, p < 0.001. The type of maltreatment explained 9% additional variance in aggressive behavior. Physical abuse, emotional abuse, and neglect were significantly associated with higher levels of aggressive behavior when controlling for demographic characteristics (physical abuse: B = 3.76, SE = 0.99, p < 0.001; emotional abuse: B = 3.77, SE = 0.93, p < 0.001, neglect: B = 2.75, SE = 1.02, p = 0.007).

Adding ecological protective factors into the model explained 16% additional variance, and a total of 26% of variance in aggressive behavior was explained by the predictors in Model 3, F (14, 432) = 10.290, p < 0.001. Higher child prosocial skills, parental well-being, and fewer problems in the neighborhood were associated with lower levels of aggressive behavior among children (prosocial skills: B = − 0.24, SE = 0.03, p < 0.001; parental well-being: B = − 0.90, SE = 0.27, p = 0.001, fewer neighborhood problems: B = − 0.47, SE = 0.19, p = 0.014), when controlling for the type of maltreatment and demographic characteristics. Child physical abuse and emotional abuse were still significantly associated with higher levels of aggressive behavior, but neglect was no longer significantly associated with aggressive behavior once the protective factors were added into the model.

In Model 4, interaction terms were added into the model in addition to control variables, maltreatment type, and protective factors. Two interaction terms (Emotional abuse × Child prosocial skills, Emotional abuse × Parental well-being) were statistically significant and were retained in Model 4, F (16, 430) = 11.091, p < 0.001. Model 4 explained 30% of variance in aggressive behavior. The inverse relationship between child prosocial skills and aggressive behavior was stronger in emotionally abused children compared to those who have not been emotionally abused (Fig. 1). Similarly, the inverse association between parental well-being and child aggressive behavior was stronger in emotionally abused children compared to those who had not experienced emotional abuse (Fig. 2). Child physical abuse and emotional abuse were still significantly associated with higher levels of aggressive behavior in Model 4. Parental well-being was no longer significantly associated with aggressive behavior once the interaction terms were added into the model whereas child prosocial skills and

Table 2
Correlations among study variables (N = 447).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Child aggressive behavior	–													
2. Child age	0.03	–												
3. Child gender_female	− 0.01	− 0.01	–											
4. Child race_Black	− 0.01	− 0.04	− 0.05	–										
5. Caregiver HS plus	− 0.07	− 0.01	0.06	0.01	–									
6. Physical abuse	0.18**	0.09	− 0.10*	− 0.01	0.04	–								
7. Sexual abuse	0.01	0.03	0.11*	− 0.06	0.08	− 0.09	–							
8. Emotional abuse	0.23**	0.06	− 0.05	− 0.02	− 0.09	0.14**	0.05	–						
9. Neglect	0.12*	− 0.04	− 0.04	0.03	− 0.07	− 0.14**	− 0.19**	0.09	–					
10. Child cognitive skills	− 0.01	0.02	− 0.01	− 0.10	0.08	− 0.09	0.04	0.09	0.05	–				
11. Child prosocial skills	− 0.36**	0.10*	− 0.04	0.16**	0.09	− 0.03	0.01	− 0.09*	− 0.05	0.23**	–			
12. Parental well-being	− 0.22**	0.07	0.06	0.07	0.05	0.00	0.02	− 0.16**	− 0.22**	− 0.06	0.10*	–		
13. Parental warmth	− 0.03	− 0.03	0.02	− 0.06	0.04	− 0.04	0.04	0.05	0.00	0.09	0.12*	0.07	–	
14. Less neighborhood problems	− 0.11*	0.05	− 0.01	− 0.16**	0.03	0.02	0.00	− 0.01	− 0.05	0.16**	0.03	0.11*	0.03	–
15. Relative neighborhood safety	− 0.03	0.09*	0.04	− 0.16**	0.06	− 0.03	0.06	− 0.01	− 0.05	0.10*	0.09	0.04	0.06	0.44*

* p < 0.05.
** p < 0.01.

Table 3
Hierarchical OLS multiple regression analyses of aggression (N = 447).

Variable	Model 1		Model 2		Model 3		Model 4	
	B	*SE* B	B	*SE* B	B	*SE* B	B	*SE* B
Intercept	57.93***	4.30	54.22***	4.22	51.19***	3.90	51.67***	3.81
Control variables								
Child age (years)	0.44	0.95	0.02	0.91	0.94	0.85	0.79	0.83
Child female gender	− 0.24	0.94	0.34	0.92	0.09	0.84	0.33	0.82
Child race, Black	− 0.17	1.09	− 0.06	1.05	1.57	1.00	1.46	0.98
More than high school	− 1.16	1.14	− 1.26	1.11	− 0.73	1.02	− 0.80	0.99
Child maltreatment								
Physical abuse	–	–	3.76***	0.99	3.68***	0.91	3.44***	0.89
Sexual abuse	–	–	0.89	1.11	0.74	1.02	0.71	0.99
Emotional abuse			3.77***	0.93	2.48**	0.87	2.56**	0.85
Neglect	–	–	2.75**	1.02	1.63	0.95	1.39	0.93
Protective factors								
Child cognitive skills					0.06	0.03	0.05	0.03
Child prosocial skills	–	–	–	–	− 0.24***	0.03	− 0.14***	0.04
Parental well-being	–	–	–	–	− 0.90**	0.27	− 0.18	0.39
Parental warmth	–	–	–	–	0.02	0.04	0.03	0.04
Less neighborhood problems	–	–	–	–	− 0.47*	0.19	− 0.49**	0.19
Relative neighborhood safety	–	–	–	–	0.31	0.20	0.30	0.20
Interaction effects								
Emotional abuse × Child prosocial skills	–	–	–	–	–	–	− 0.22***	0.05
Emotional abuse × Parental well-being	–	–	–	–	–	–	− 1.27*	0.52
R^2	0.01		0.10***		0.26***		0.30***	
ΔR^2			0.09***		0.16***		0.04***	

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

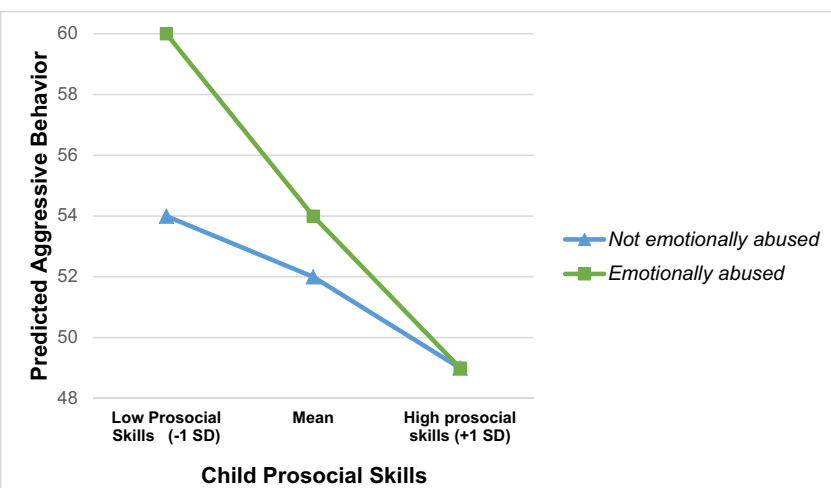

Fig. 1. Interaction effects of emotional abuse and child prosocial skills on aggressive behavior.

fewer problems in the neighborhood remained significant predictors of children's aggressive behavior in early childhood.

4. Discussion

This study examined the type of maltreatment experienced and ecological protective factors as predictors of aggressive behavior among children who have been investigated by CPS for alleged child abuse or neglect in early childhood. Furthermore, this study explored if and how the association between protective factors and aggressive behavior vary by the type of maltreatment experienced by the child in early childhood.

Physically abused children exhibited significantly higher levels of aggressive behavior in early childhood, compared to children who have not been physically abused. This is consistent with previous studies that found a significant link between physical abuse and aggressive behavior in school-aged children and adolescents (Bennett et al., 2005; Holmes et al., 2015; Manly et al., 2001; Teisl & Cicchetti, 2008), and adds additional supports to the literature by confirming this link in children at an earlier developmental stage (i.e., early childhood). Physical abuse during early childhood may be especially detrimental to child development given that this is the period in which children develop their behaviors by observing and imitating others, typically their parents, with whom they spend a substantial amount of time in the home (Bandura, 1978). Young children who experience physical abuse from their parents will likely learn and imitate the parents' violent and aggressive behaviors.

Conversely, living in a neighborhood with fewer problems (e.g., assaults, delinquency, gangs, open drug use, unsupervised children) was associated with lower levels of aggressive behavior in children. This finding is in line with prior research that suggests the important influence of neighborhood context in the development of behavior

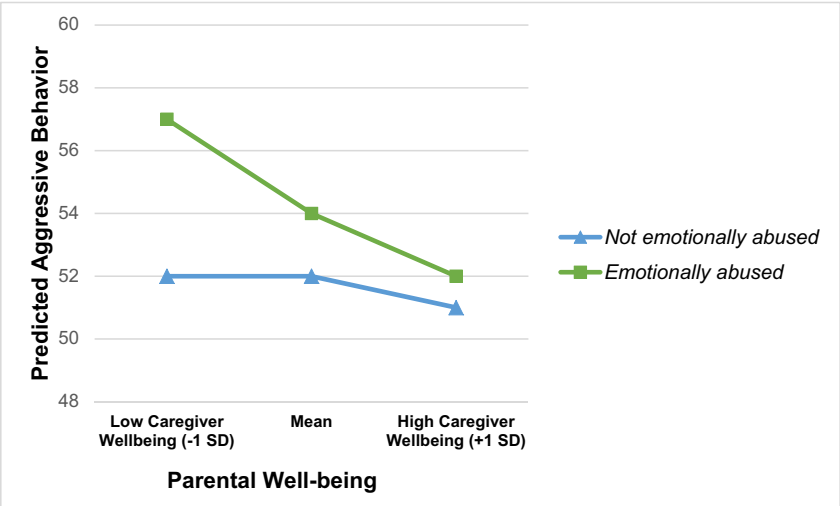

Fig. 2. Interaction effects of emotional abuse and parental well-being on aggressive behavior.

problems, including aggressive behavior, in children at-risk (Colder, Mott, Levy, & Flay, 2000; Lansford et al., 2006). Living in a neighborhood with fewer problems may have a positive influence on children's behavioral functioning because children are protected from exposure to additional violent behaviors (e.g., community violence) outside their homes. Further, children may benefit from supportive non-parental adults in the neighborhood as these adults may serve as positive role models to the children (Molnar, Cerda, Roberts, & Buka, 2008) and provide social-emotional buffering against the effects of chronic stress (Cohen & Wills, 1985).

A novel contribution of this study is the finding of significant interaction effects of emotional abuse with child prosocial skills and parental well-being on early childhood aggression. The protective effects of child prosocial skills were stronger in emotionally abused children than in children who had not been emotionally abused. These findings suggest that while emotionally abused children are at risk of developing aggression in early childhood, the presence of child prosocial skills may offset some of the risk for aggressive behavior in emotionally abused children.

Emotionally abusive parents are often psychologically controlling (intrusive, inhibiting, and manipulative behaviors), verbally/non-verbally abusive (e.g., spurning, terrorizing), and/or emotionally non-responsive (e.g., ignoring the child, failing to express affection), and the child often mimics their maladaptive social skills, showing abusive, controlling, and aggressive behavior (Barber, 1996; Hosier, 2013). Moreover, emotionally abused children may be demonstrating aggression based on a frustration response (Berkowitz, 1989). For these emotionally abused children, improved pro-social skills (i.e., socially oriented strategies) may help alleviate the feelings of frustration that lead to aggression by providing opportunities for regulating emotions, solving conflict in a positive manner, cooperating with peers, and obtaining desired resources in socially acceptable ways (Hawley, 1999).

Similarly, parental well-being had a stronger inverse association with aggression in emotionally abused children. This finding may be explained by the close association between emotional abuse and parental well-being. Emotionally abused children had parents with significantly lower well-being scores ($M = 4.98$, $SD = 1.75$) than non-emotionally abused children ($M = 5.49$, $SD = 1.49$) in this study, $t(446) = 3.324$, $p = 0.001$. Prior research has also reported that parental depression and substance abuse are associated with child emotional abuse (Matsuoka et al., 2006; Seay & Kohl, 2015; Zuravin, 1989). For example, substance dependent and depressed mothers were more likely to self-report the act of emotional maltreatment than mothers with neither condition (Seay & Kohl, 2015). Parents may become more verbally/non-verbally abusive (e.g., spurning, terrorizing) or emotionally non-responsive (e.g., ignoring the child, failing to express affection) when using substances or feeling depressed (Matsuoka et al., 2006), increasing the risk of their children exhibiting aggressive behavior. Therefore, emotionally abused children may especially benefit from parents who have higher well-being (i.e., no major depression and substance use problems) and are able to provide emotional affection and support, which will ultimately help the children regulate their feelings and emotions and behave in non-aggressive ways.

Several maltreatment types (i.e., sexual abuse, neglect) and protective factors (i.e., child cognitive abilities, parental warmth, and parental perception of relative neighborhood safety) were not significantly associated with aggressive behavior in early childhood. The lack of a significant relation of child aggressive behavior with sexual abuse or neglect may be because sexually abused and/or neglected children are more likely to internalize their feelings and trauma, rather than to act out (e.g., Manly et al., 2001; Tremblay et al., 1999). Alternatively, having only two items to assess for sexual abuse may have limited the ability to detect the relationship between sexual abuse and aggression.

No significant association between child cognitive abilities and children's aggressive behavior suggest that social-emotional factors may have stronger influence than cognitive factors during early childhood. Social-emotional development is a key developmental task in early childhood (Cooper, Masi, & Vick, 2009) and may play a more salient role in explaining children's aggressive behavior than do cognitive factors, which tend to become increasingly critical once children enter formal school (i.e., middle childhood) (Fischer & Bullock, 1984).

Parental warmth was also not significantly associated with early childhood aggressive behavior. Interpreted within the context of the high-risk sample used in this study (i.e., children and families who have been involved with CPS for child maltreatment), this finding may suggest the parents in the child welfare system are not showing levels of parental warmth needed to counterbalance the negative effects of maltreatment and other risk factors on early childhood aggression. Alternatively, there may be an observer effect occurring with the collection of parental warmth data, in which families are more likely to present positive parenting behaviors during an observation (Bennett, Wolan Sullivan, & Lewis, 2006). Regardless, this study is not unique in the lack of a significant association between maternal warmth and child behavior problems as Leventhal, Martin and Brooks-Gunn (2004) also did not find significant correlations between the maternal warmth and child behavior outcomes in two of the five studies they examined.

Finally, parents' perception of relative neighborhood safety compared to other neighborhoods was not significantly associated with children's aggressive behavior in early childhood. This finding may

suggest that more straightforward and observable safety indicators, such as crime and drug use, better capture the influence of neighborhood on aggression, but more research is needed to further explore how different measures of neighborhood safety may differently predict aggressive behavior in early childhood.

4.1. Strengths and limitations

The current study has several limitations. First, the NSCAW-I data used in the current study were collected in 1999/2000. Although the data are old, this source is widely considered the most comprehensive and rigorous child welfare data currently available. NSCAW-I was selected over NSCAW II because of a larger sample meeting inclusion criteria for the current study. Second, the cross-sectional nature of the data limits our ability to make any causal connections among maltreatment type, protective factors, and aggressive behavior in early childhood. The use of a cross-sectional sample (i.e., children ages between four and five at Wave 1) was considered to be the most appropriate approach to address our research questions, given our strong focus on young victims of maltreatment and early childhood aggression. Additionally, not all study measures were available at later time points, limiting our ability to examine the relationships among study variables longitudinally. Future research should examine these relationships longitudinally in order to understand how maltreatment and protective factors work together over time to influence developmental trajectories of aggressive behavior. Third, measures of the child's aggressive behavior were reported by the parent, which may be subject to response bias. Despite some limitations of parent reportedchild aggression, such as parents' tendency to over-report their children's symptoms, this was considered the best available measure given the young age of the children in the study and the lack of available data from other sources (e.g., teacher reports). Future studies may benefit from incorporating diverse methods (e.g., observation) and informants (e.g., preschool teachers) to assess aggressive behavior of children. Relatedly, the aggression measure used in the current study does not capture or distinguish various forms of aggression (e.g., relational vs. overt aggression). For example, relational aggression − defined as behaviors that are intended to damage another's social status, relationships, or feelings or inclusion − that is particularly relevant and important to females (Keenan, Coyne, & Lahey, 2008) was not adequately assessed by the current measure. Future research should examine different forms of aggression to see how different types of maltreatment and multi-level protective factors are differently associated with distinctive forms of aggression. Furthermore, future research may benefit from examining how predictors studied in the current study are be associated with internalizing behavior problems. Finally, the generalizability of study findings is limited. The study sample consisted of children who were contacted by CPS for alleged child maltreatment, and thus, the findings may not be generalizable to the general population.

Despite the above limitations, this study has several strengths. Large sample size and the use of standardized measures in this study support the validity of the findings. This study further extended previous research on child maltreatment and aggression by focusing on maltreatment victims at younger ages (i.e., ages 4–5), filling the gap in our knowledge of early childhood aggression among young maltreated children. Finally, this study contributed to the existing knowledge base by examining the unique and combined roles of early risk and protective factors in understanding early childhood aggression.

4.2. Conclusions and implications

The findings of this study offer several implications for child welfare practice both in terms of potential for interventions targeting specific groups of children and families as well as implications for neighborhood and community-level supports. Our results indicate that physically abused children may be at higher risk of developing early childhood aggression and consequently are a population for whom interventions should be targeted. The results of this study further suggest that in cases where children have been emotionally abused, two distinct target areas of intervention may be particularly helpful. First, interventions designed to target parental well-being, such as treatment for substance abuse or parental mental health concerns may work to provide a child with a safe, stable, responsive caregiver, which may then decrease the likelihood of the child demonstrating concerns with aggressive behaviors. Secondly, for children experiencing emotional abuse, higher prosocial skills were associated with lower levels of aggression, indicating that programming promoting prosocial skill development may be especially beneficial for this population.

This study's emphasis on the interaction effects of individual and social/ecological factors influencing aggression leads to additional implications for practice and policy. The findings of parental well-being as well as neighborhood problems influencing child aggression support the reality of children living within and being influenced by myriad factors within complex environments. Highly effective programming will need to address risk and protective factors across all levels of functioning to achieve optimal outcomes rather than focusing on any one level at a time. This may be a challenging task for community agencies and will likely require collaboration between organizations in order to provide services to children, adults and families as well as intentional efforts to influence policies that may address concerns such as neighborhood safety, substance abuse, and general parental well-being.

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