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Predicting child abuse potential: An empirical investigation of two theoretical frameworks

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Abstract

This study investigated two theoretical risk models predicting child maltreatment potential: 1) Belsky's (1993) developmental-ecological model and 2) the cumulative risk model in a sample of 610 caregivers (49% African American, 46% European American; 53% single) with a child between 3 and 6 years old. Results extend the literature by using a widely accepted and valid risk instrument (i.e., CAPI) rather than occurrence rates (e.g., reports to child protective services, observations). Results indicated Belsky's (1993) developmental-ecological model, in which risk markers were organized into three separate conceptual domains, provided a poor fit to the data. In contrast, the cumulative risk model, which included the accumulation of risk markers, was significant in predicting child abuse potential.

Approximately 870,000 children were victims of substantiated maltreatment in the United States in 2004 (U.S. Department of Health and Human Services, 2006), which is extremely alarming given that child abuse often results in serious long-term emotional, cognitive, and physical difficulties (Aber, Allen, Carlson, & Cicchetti, 1989; Dubowitz, Pitts, & Black, 2004; Egeland, Yates, & Appleyard, 2002). Researchers, clinicians, and professionals in the child maltreatment area agree on the urgency of investigating this major problem and have focused on the identification of critical antecedents or risk factors for maltreatment as a way to reduce and ultimately prevent its occurrence.

Measurement of Child Abuse Potential

When investigating child maltreatment, it is important to consider method of measurement because the information will vary depending on the data source. For example, commonly used methods for obtaining child maltreatment incidence rates include self-reports from parents and the number of referrals to Child Protective Services (CPS). However, these methods have several obstacles and limitations (see Chaffin & Valle, 2003), including parent reluctance to admit abuse or neglect (Ammerman, 1998), and difficulties involved in accessing CPS administrative databases (Chaffin & Valle, 2003), which result in underestimated rates of abuse and neglect (Chalk & King, 1998). To avoid these critical limitations, researchers have utilized child maltreatment risk instruments which provide information regarding the likelihood or 'potential' for the respondent to perpetrate child maltreatment. The most widely used and strongly supported child maltreatment risk instrument is the Child Abuse Potential Inventory (CAPI; Milner, 1986). Recent literature has identified the CAPI as a valid instrument to assess risk or potential for child maltreatment (Chaffin & Valle, 2003), and the CAPI has been considered the primary risk assessment tool currently available (Medora, Wilson, & Larson,

2001). However, it is important to understand the limitations of risk potential inventories, and to note the distinction often made between risk factors and risk markers.

First, Chaffin and Valle (2003) argued that reducing *risk* may not be equivalent to rates of actual child abuse occurrence. Specifically, *child abuse occurrence* typically refers to a determination of child abuse by an official agency, while *child abuse potential* refers to a parent's self-report of the likelihood or possibility of abuse perpetration. While child abuse potential does not necessarily imply the actual 'commission' of abuse, studies have indicated that CAPI scores are highly correlated with actual abuse occurrence (Chaffin & Valle, 2003; Milner et al., 1984). Second, the literature contains some ambiguity around the term *risk*, specifically regarding whether particular findings support the presence of risk markers versus risk factors. Risk markers are often defined as variables that are correlated with the outcomes of interest, although the findings do not lend strong empirical support for a causal relationship (Haynes, Spain, & Oliveira, 1993). While some researchers use the term 'risk factor' to imply causation, several requirements must be met in order to determine causality within structural equation models. Specifically, (a) the 'causal' variable must be isolated from all other potential variables, (b) an association must exist between the variables of interest, and (c) direction of influence must be determined (Bollen, 1989). Since the literature tends to use these terms interchangeably and often confuses the terminology, it is important to point out the terminology from the outset. The current paper uses the term "risk marker" to describe variables contributing to child abuse occurrence and potential, but makes no assumption as to the causal role of these variables.

The Developmental-Ecological Model of Child Maltreatment

Over the past three decades, researchers have put an increasing emphasis on understanding the overlapping contributions that individual and environmental factors (or variables) have on child outcomes as discussed by Bronfenbrenner (1977) in his seminal work. Researchers have extended Bronfenbrenner's theory specifically to child maltreatment by investigating the correlational and causal relationships among multiple markers associated with child abuse potential (Ayoub, Willett, & Robinson, 1992). The developmental-ecological theory assumes that multiple levels of risk, ranging from individual characteristics to larger socio-environmental variables, must be taken into account when attempting to understand the antecedents of child maltreatment (Belsky, 1993).

Caregiver risk markers

Certain caregiver characteristics have long been recognized as important risk markers for child maltreatment (Egeland, Jacobvitz, & Papatola, 1987; Medora et al., 2001; Miller, Handal, Gilner, & Cross, 1991). For example, literature reviews (i.e., Ertem, Leventhal, & Dobbs, 2000) suggest that approximately 30% of caregivers with a childhood abuse history go on to abuse their own children, with perpetration rates ranging between 7% and 70%. Researchers also have linked lower parenting satisfaction to heightened risk for child abuse potential (Rodriguez, 2008). Higher child abuse potential was found in caregivers who felt they had less control over difficult child behavior (i.e., Bugental, Blue, & Lewis, 1990) and held negative internal attributions regarding their caregiver styles and actions of their children (Sanders et al., 2004).

Child risk markers

Researchers also have linked multiple child risk markers to incidents of child maltreatment (Ammerman, 1991; Belsky, 1993; Straus, Gelles, & Steinmetz, 1980), with specific markers forming the conceptual model being tested in this study (i.e., child's age, physical health, and disruptive behaviors). Specifically, child age appears to follow a curvilinear pattern, with

physical abuse most common between ages 3 and 8 (Egley, 1991). Early studies indicated that child abuse potential increased as physical health of children decreased (Ammerman, Hersen, Van Hasselt, McGonigle, & Lubetsky, 1989). Finally, studies have indicated that abuse was more common when children displayed disruptive behaviors (Trickett, Aber, Carlsen, & Cicchetti, 1991).

Sociodemographic characteristics

Maternal ethnicity, age, marital status, and family income/economic status also have been identified as risk markers associated with child abuse potential. When investigating maternal ethnicity, studies have identified a link between ethnicity and involvement with child protective services (CPS), in that African American caregivers had more reports of child maltreatment occurrence than European-American and Latino caregivers (Carnegie Task Force, 1994; Davis & Proctor, 1989). Further, findings suggest that single, young, low-income mothers appear to be at highest risk for child abuse occurrence (Berger, 2005) and child abuse potential (de Paul & Domenach, 2000). Researchers also have associated child abuse potential with maternal educational attainment; potential was greater among mothers who did not complete high school (Murphey & Braner, 2000).

Household characteristics

Household disorganization also may be associated with abuse occurrence (Elmer, 1967), as a disorganized home is related to the stressful home environment. In addition, larger family size and less available household space have been linked to increased physical abuse occurrence (Connelly & Straus, 1992).

Caregiver-child interactions

Abusive versus non-abusive caregivers have been distinguished in the nature of their interactions with children. Research studies have indicated that abusive caregivers engaged in fewer positive interactions, were less responsive, and expressed less positive affection toward their children, compared to non-abusive caregivers (Trickett & Susman, 1988). These findings provide the rationale for empirically supported treatments, such as Parent Child Interaction Therapy (PCIT; Chambless & Ollendick, 2000), aimed at reducing negative interactions between caregivers and their children. Studies indicated that PCIT is associated with decreased child abuse occurrence rates (Chaffin et al., 2004), thus supporting the proposition that coercive parent-child interactions may be causal processes actively contributing to abuse.

Neighborhood characteristics, community, and social support

Findings from a recent literature review indicated that reports to CPS were concentrated to disadvantaged neighborhoods and that negative neighborhood characteristics (e.g., neighborhood social or economic deprivation, neighborhood resources) were significantly associated with child maltreatment occurrence (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007). Further, studies have consistently indicated that quality and satisfaction with one's social support may be more important than quantity of support. When specifically investigating social support of mothers, researchers found that higher satisfaction with social support was a significant inverse predictor of child abuse potential, while quantity of social support was not a significant predictor (Schaeffer, Alexander, Bethke, & Kretz, 2005).

Theoretical Contributions

Researchers in the child maltreatment area have examined several theoretical models to describe the multiple risk markers involved in predicting child abuse potential. While many theoretical models contain similar risk markers as those described above, the framework and

contribution of them differs among models within the literature. Two well-established theoretical frameworks include (1) the developmental-ecological model, and (2) the cumulative risk model.

The developmental-ecological model

Based on Bronfenbrenner's seminal work (illustrated in Figure 1), Belsky's (1993) developmental-ecological model assumes that risk markers for physical child abuse are organized around three major conceptual domains: 1) the developmental-psychological, 2) immediate, and 3) broader domain. The *developmental-psychological* domain includes markers that caregivers and children "bring with them" to the family setting and which affect the potential for child maltreatment, including caregiver markers (i.e., caregiver abused as a child, parental stress, parental control attributions, parental satisfaction) and child markers (i.e., child age, child physical health, child disruptive behavior). The family environment and the way caregivers interact with their children characterize the *immediate* conceptual domain, which contains sociodemographic characteristics, home disorganization, family size, household space, and caregiver-child interactions. Finally, the model posits that researchers must go beyond the immediate domain of the family and household to investigate variables such as family's neighborhood and community and social support, as families both influence and are influenced by their social surroundings. Specifically, the *broad* conceptual domain includes neighborhood characteristics, available resources, involvement in the neighborhood, and access to peer network.

Cumulative risk model

The cumulative risk model assumes that the more risk markers endorsed, irrespective of their nature, the higher the potential for negative outcomes. As risk markers typically co-occur, the cumulative risk model investigates how specific risk markers function in the context of one another (Appleyard, Egeland, van Dulmen, & Sroufe, 2005). The cumulative risk model is different from the developmental-ecological model in that it measures the total number of risk markers present rather than specific scores on each individual risk marker.

Findings from studies on child maltreatment (Appleyard et al., 2005) as well as other areas of child psychology (Deater-Deckard, Dodge, Bates, & Pettit, 1998; Greenberg, Speltz, DeKlyen, & Jones, 2001; Sameroff, 2000) have indicated empirical support for the cumulative risk model. For example, Sameroff and colleagues conducted a number of studies investigating multiple risk markers for negative child outcomes. Results indicated that the number of risk markers endorsed (i.e., cumulative risk), rather than scores on each individual risk marker, was associated with behavior problems in preschool (Sameroff, Seifer, Zax, & Barocas, 1987) and adolescent negative outcomes (Sameroff, Bartko, Baldwin, Baldwin, & Seifer, 1998). Similarly, in another study, accumulation of risk markers predicted an increase in behavior problems during adolescence (Appleyard et al., 2005), providing additional support for the cumulative risk model. Despite support of the model in other child outcomes, researchers have yet to test empirically the cumulative risk model in the prediction of child abuse potential. Applied to the current study, support of this model would suggest that caregivers endorsing a greater absolute number of risk markers would display higher scores on a measure of child abuse potential.

Aims of the Current Study

Thus, to date, there have been a handful of empirical studies examining how specific risk markers contribute to child abuse potential. However, researchers have not conducted a comprehensive empirical investigation to determine how these risk markers are organized. To accomplish this goal, the current study was designed to examine empirically two theoretical

frameworks: 1) the developmental-ecological model and 2) the cumulative risk model. Results will contribute to our understanding of which conceptual framework appears to provide a better description of the organization of risk markers when predicting child abuse potential.

As discussed previously, empirical evidence suggesting that the risk markers for child abuse potential are organized into the three conceptual domains (i.e., developmental-psychological, immediate, and broader) would support the *developmental-ecological model*. Conversely, results supporting the *cumulative risk model* would suggest that the specific risk markers are not as important as the overall number of markers endorsed. Based on previous literature, it was hypothesized that a greater number of risk markers would be associated with increased child abuse potential, consistent with the cumulative risk model.

Method

The current study used data from a large intervention project, Parenting Our Children to Excellence (PACE), and relied exclusively on data collected before any intervention took place.

Participants

The 610 participating caregivers consisted of 566 mothers or mother figures and 44 fathers or father figures (hereafter referred to as “parents”), each with one target child between the ages of 3 and 6 at time of recruitment. Parents ranged in age from 17 to 63 ($M = 31.05$, $SD = 7.12$). Forty-nine percent described their ethnicity as African American, 46% as European American, and 5% as Other (i.e., Asian, Native American, Hispanic, or Biracial). Forty-seven percent were married or lived with an adult partner; 53% were single. Parents had an average of 12.64 years education ($SD = 2.68$), with 13% of parents not completing high school. Mean yearly household income was \$26,572 ($SD = \$11,109$), which was well below the median household income in Indianapolis (\$40,421) at the time of the study (U.S. Census, 2005). Boys were represented in comparable proportions to girls (53% vs. 47%), with a mean age of 4.45 for boys ($SD = 0.77$, range = 2.90 to 6.00) and 4.36 for girls ($SD = 0.79$, range = 2.87 to 5.96).

Procedures

All procedures were approved by the Purdue University Institutional Review Board (IRB). Prior to the start of the PACE program at each center, parents completed a structured survey administered by a trained interviewer, which included measures of risk markers. Parents gave prior consent and received \$50 in compensation for their time. Parents were recruited through the daycare centers their children attended with the help of Child Care Answers, a daycare provider and licensing agency. To participate in the PACE program, daycare centers had to serve a minimum of 35 families with children ages 3 to 6 and an economically and ethnically diverse population. Recruitment at each daycare center began 6 weeks prior to the predetermined group start date and continued until the first day of the group. Parents themselves did not have to meet specific criteria to participate and were not recruited to obtain predetermined percentages of participants from certain ethnic groups.

Measures

Child Abuse Potential Inventory—The CAPI is a 160-item, self-report screening instrument for child physical abuse risk, endorsed in an ‘agree/disagree,’ forced-choice format. The main risk indicator (i.e., the Abuse Scale) was used in the current study, which consists of 77 items. Internal consistency estimates (alpha) for the CAPI Abuse Scale range from .85 to .98 for physically abusive parents and general population groups (Milner, 1994). The CAPI has shown adequate test-retest, construct, predictive, and concurrent validity in previous studies (see review by Milner, 1994). In the current study, the CAPI showed high internal

consistency (Cronbach's alpha = .90) and adequate inter-item correlations (range = .00 to .53). See Table 1 for correlations between the CAPI and the risk markers.

Risk Markers

Parent abused as a child: This was assessed by the sum of responses from four items on the CAPI, which are not included in the Abuse Scale. These four items include: (1) 'My parents did not really care about me,' (2) 'As a child, I was abused,' (3) 'As a child, I was knocked around by my parents,' and (4) 'As a child, I was often afraid.' In the current study, this measure showed adequate internal consistency (Cronbach's alpha = .71), inter-item correlations ($M = .40$, range = .28 to .57) inter-scale correlations (range = .03 to .23), and criterion-referenced validity when compared to other parental risk markers.

Parental stress: The amount of stress a parent encounters was assessed by the *Parenting Stress Index/Short Form (PSI/SF)* (Abidin, 1995), which is a 36 item questionnaire. Parents rated how well each item applied to their own situation on a 5-point Likert scale ranging from (1) 'Strongly agree to' (6) 'Strongly disagree.' Abidin (1997) found that the PSI/SF was internally consistent (Cronbach's alpha = .91) and stable over a 6-month period (.84) in a normative sample. The PSI demonstrated adequate internal consistency (Cronbach's alpha = .91), inter-item correlations ($M = .22$, range = .03 to .75), and inter-scale correlations (range = .23 to .65) in this study.

Parental satisfaction: The Satisfaction subscale of the *Being a Parent (BP)* instrument was used to measure the parent's level of satisfaction with the parent-child relationship. The BP is a 16-item questionnaire with responses ranging from (1) 'Strongly agree' to (6) 'Strongly disagree.' The Satisfaction subscale consists of 9 items, such as "Being a parent is manageable, and any problems are easily solved," "I meet my own personal standards for the care I think my child should receive," and "I honestly think I have all the skills necessary to be a good parent to my child." The subscale showed adequate internal consistency (Cronbach's alpha = .72), inter-item correlations ($M = .27$, range = .14 to .44), and inter-scale correlations (range = .03 to .65) in the current study.

Parental control attributions: The extent to which a parent felt he/she was able to exert personal control over their child's behavior was operationalized by the *Parental Locus of Control Scale (PLOC-SF)* (Lovejoy, Verda, & Hays, 1997). The 30-item questionnaire requires parents to rate their level of personal control on a Likert scale, (1) 'Strongly agree' to (6) 'Strongly disagree.' Researchers have found the PLOC-SF to be internally consistent, with Cronbach's alphas of .81 (Roberts, Joe, & Rowe-Halbert, 1992) in a large sample of clinic referred, oppositional children and .70 (Lovejoy et al., 1997) in a sample of community mothers, and to show adequate test-retest reliability. In addition, the PLOC-SF correlates with similar measures assessing parental control attributions (Lovejoy et al., 1997). The PLOC-SF demonstrated adequate internal consistency (Cronbach's alpha = .77), inter-item correlations ($M = .11$, range = .20 to .53), and inter-scale correlations (range = .08 to .65) in this study.

Child age: Each parent reported the target child's birthdate, which was used to calculate the child's age at the start of the PACE program at each center (pre-intervention). When a parent had more than one child between the ages of 3 and 6, the oldest child was identified as the target child.

Child physical health: Each parent responded to two questions: (1) "In general, would you say your child's physical health is: Excellent, Good, Fair, or Poor," and (2) "To what extent does health limit your child in any way, keeping him/her from activities he/she wants to do? (0) 'None at all,' (1) 'A little,' (2) 'Some,' or (3) 'A Great deal.'" The responses to these items

were averaged, which showed adequate internal consistency (Cronbach's alpha = .61), adequate inter-item correlations ($M = .44$), and low inter-scale correlations (range = .04 to .06).

Child disruptive behavior: Each child's level of disruptive behavior was assessed by obtaining an average of the standardized sums of two scales: The *Eyberg Child Behavior Inventory-2 (ECBI)*; Boggs, Eyberg, & Reynolds, 1990) and the Anger-Aggression subscale on the parent version of the *Social Competence Behavior Evaluation-30 (SCBE-30)*; LaFreniere & Dumas, 1996). The ECBI is a 36-item, frequency-of-occurrence parent rating scale ranging from (1) 'never' to (7) 'always,' which allows parents to record how often each disruptive behavior occurs. Among clinic referred children, the ECBI has shown high concurrent validity with other externalizing measures of child behavior (i.e., CBCL – Externalizing, $r = .86$; Boggs et al., 1990). The scale demonstrated adequate internal consistency (Cronbach's alpha = .91), inter-item correlations ($M = .23$, range = .09 to .76), and inter-scale correlations (range = .07 to .75) in the current study.

The parent version of the SCBE-30, adapted from the validated teacher version of the same measure (LaFreniere & Dumas, 1996), is a 30-item, Likert rating scale, in which 10 items make up the Anger-Aggression subscale. In previous research, this subscale demonstrated high internal consistency (Cronbach's alpha = .82) and construct validity among a normative population, as it is significantly associated with identifiable behavioral differences in children (Kotler & McMahon, 2002). The SCBE-30 showed adequate internal consistency (Cronbach's alpha = .85), inter-item correlations ($M = .35$, range = .19 to .59), and inter-scale correlations (range = .06 to .75) in the current study. Sums of ECBI and SCBE-30 Anger-Aggression subscale were standardized and combined to create a total score for child disruptive behavior, as the measures were significantly correlated with one another ($r = .75$, $p < .001$) and demonstrated high internal consistency (Cronbach's alpha = .93) and inter-item correlations ($M = .24$, range = .09 to .76) when combined.

Sociodemographic characteristics: Parental ethnicity, age, marital status, income level, educational attainment, and employment status were obtained from each parent.

Household disorganization: The *Confusion, Hubbub, and Order Scale (CHAOS)*; Matheny, Wachs, Ludwig, & Phillips, 1995), a 15-item questionnaire, assesses the extent of noise, confusion, clutter, frantic activities, and disorganization in the home. Adequate point-biserial correlations between individual items and total CHAOS score (Coefficient alpha of .79), 12-month test-retest stability (correlation of .74), and high correlations of observational measures of home disorganization and parenting have been reported in a normative sample (Matheny et al., 1995). In two separate studies of normative samples, Dumas et al. (2005) found the CHAOS scale to have high internal consistency, with Cronbach's alphas of .81 and .83. In the current study, the CHAOS showed adequate internal consistency (Cronbach's alpha = .83), inter-item correlations ($M = .25$, range = .03 to .54), and inter-scale correlations (range = .20 to .33).

Family size and space: To measure family size, the parent provided an open-ended response when asked, "Including yourself, how many people (children and adults) total live in your household at least 4 nights a week?" To assess available space within the household, parents were asked to provide an open-ended response to the additional question, "How many rooms are in your current home?" The number of total people in the household was divided by the number of rooms, to obtain a quantitative measure of available space within the household. In the current study, these items demonstrated adequate inter-scale correlations (family size: range = .08 to .54; space: range = .08 to .54).

Parent-child interactions: Responses on measures of parental attitudes and parent-child communication were standardized and averaged: the Warmth/Respect subscale of the *Parent*

Attitudes Toward Childrearing-II scale (PACR-II; Goldberg & Easterbrooks, 1988) and the *Parent-Child Communication* scale (CMM). The 22 items, taken from the original 68-item PACR-II, make up the Warmth/Respect subscale used in the current study. Cronbach's alphas ranged from .69 to .89 (Goldberg & Easterbrooks, 1988) in previous studies of both normative and clinical populations; the current study demonstrated adequate internal consistency (Cronbach's alpha = .77), inter-item correlations ($M = .18$, range = .18 to .62), and inter-scale correlations (range = .02 to .46) in the current study.

The CMM is a 20-item questionnaire, in which parents rate their communication with their child on a scale ranging from (1) 'definitely not true' to (4) 'definitely true.' Example items include, "My child and I argue a lot;" "It takes me no time to lose my temper with my child;" and "When I get mad with my child, I often say things that I will regret later." The CMM showed adequate internal consistency (Cronbach's alpha = .83), inter-item correlations ($M = .20$, range = .12 to .56), and inter-scale correlations in the current study. Sums of PACR-II and CMM were standardized and combined to create a total score for parent-child interactions, as the measures were significantly correlated with one another ($r = .24, p < .001$) and demonstrated high internal consistency (Cronbach's alpha = .82), inter-item correlations ($M = .18$, range = .18 to .62), and inter-scale correlations (range = .08 to .31) when combined.

Neighborhood characteristics: The *Dangerous Neighborhood Questionnaire (NB)* is a 19-item scale, used to evaluate neighborhood quality. Parents responded on a frequency scale: (1) 'Never,' (2) 'Once,' (3) 'A few times,' or (4) 'Often,' regarding the number of times that unpleasant, often dangerous, events (e.g., "A family member was robbed or mugged," "There was a gang fight near your home," "You saw cars speeding or driving dangerously on your street") have occurred in the neighborhood over the past year. This measure was internally consistent (Cronbach's alpha = .89), and showed adequate inter-item correlations ($M = .31$, range = .09 to .62) and low inter-scale correlations (range = .03 to .19).

Available resources: The Available Resources subscale of the *Neighborhood Services and Activities Questionnaire (NCR)* assessed available resources to families. The 15-item scale allowed parents to rate whether or not a resource was available in the neighborhood he/she resided, (0) 'No' or (1) 'Yes,' (e.g., "Community recreation centers or programs," "Community watch," "Programs that provide food or clothing for people who need it.") The subscale was internally consistent (Cronbach's alpha = .84), and demonstrated adequate inter-item correlations ($M = .28$, range = .08 to .71) and low inter-scale correlations (range = .01 to .13).

Parental involvement in the neighborhood: The Parent Involvement subscale of the *Neighborhood Services and Activities Questionnaire (NCR)* was used to assess parental involvement in the neighborhood. Parents answered 15 items regarding whether a specific resource was available within their neighborhood, from the list of available resources, on a 3-point Likert scale: (0) Not at all, (1) A little bit, or (3) A lot. The scale was internally consistent (Cronbach's alpha = .85), and demonstrated adequate inter-item correlations ($M = .17$, range = -.13 to .98) and low inter-scale correlations (range = .08 to .14).

Parental access to peer network: The *Neighborhood Satisfaction Questionnaire (GLS)* was used to assess parental access to peer network. The 16-item questionnaire assessed whether parents had access to a peer network, and their satisfaction with this (e.g., "Think of a typical week. About how many times did you talk on the phone with your friends or family and how satisfied are you with this situation?"). The measure showed adequate internal consistency (Cronbach's alpha = .69) and inter-item correlations ($M = .15$, range = .04 to .53), and low inter-scale correlations (range = .01 to .19).

Results

Data were analyzed for outliers, and 3% of parents were deleted (original $N = 631$, subsequent $N = 610$). Upon examination of parameters, no significant skewness was detected (values greater 2.0; e.g., Curran, West, & Finch, 1996). Given the average skewness ($M = 1.15$) and range (-2.41 to 2.18) in the dataset, normality was assumed. See Table 1 for correlations between risk markers.

Developmental-Ecological Model

Results were tested with structural equation modeling using LISREL 8.7 (Jöreskog & Sörbom, 1993). Model fit was assessed through examination of several fit indices. Overall model fit is determined by the χ^2 statistic; a significant χ^2 indicates a lack of fit between the theoretical model and the sample data and suggests that the model may not be empirically supported (Hoyle, 1995). The Goodness-of-Fit Index (GFI) assesses the relative amount of variance and covariance in the sample matrix that can be jointly explained by the population matrix, which is analogous to the R^2 statistic reported in multiple regression; a GFI value greater than .90 indicates a good fit of the theoretical model (Jöreskog & Sörbom, 1984). The root mean square approximation (RMSEA) takes into account the error of approximation in the population, which is estimated on the basis of the degrees of freedom; a value less than .06 indicates a good fit of the theoretical model (Hu & Bentler, 1999). The comparative fit index (CFI) provides a measure of model misspecification, with larger values indicating decreasing amounts of misspecification; a CFI greater than .90 indicating good model fit (Bentler, 1990).

Prior to running the full developmental-ecological model, analyses were conducted on the measurement model containing all risk markers to determine fit of these markers to the latent constructs (Byrne, 1998). Based on modification indices from initial models, several error variances were allowed to correlate. Results suggested that the fit of the measurement model was not acceptable ($\chi^2 = 2076.04$, $p < .001$; GFI = .77; RMSEA = .12; CFI = .71), indicating that the risk markers did not accurately describe the latent constructs proposed within this theoretical model (i.e., the developmental-psychological, immediate, and broad conceptual domains). Based on these results, investigating fit of the structural model (i.e., the full developmental-ecological model), to indicate the links among the latent constructs, was inappropriate (Byrne, 1998).

Cumulative Risk Model

Procedures for calculating cumulative risk followed those of Appleyard et al. (2005). Each risk marker was transformed into a dichotomous variable and summed into a cumulative risk scale. Analyses investigated various cutoff scores for each continuous variable (i.e., top 95%, 85%, and 75% of the current sample) to examine the results of these different cutoffs. For each cutoff, parents scoring above the specific percentile were coded as 1 to indicate higher risk, with others coded as 0 to indicate lower risk. Two factors were excluded from the analyses of cumulative risk: parent gender due to the low number of fathers in the study, and child age due to the restricted range (age 3, 4, and 5). Therefore, cumulative risk scale was calculated by summing the remaining 20 dichotomous risk markers. Existing literature in the maltreatment area suggests a cutoff of 167 for CAPI scores; no parents in the current study received scores above 167, so cutoffs were calculated in the same manner as for the risk markers (i.e., cutoffs of 95%, 85%, and 75%), which corresponded to scores of 97, 84 and 74 respectively.

Multiple linear regression analyses were conducted to predict CAPI scores from cumulative risk for each cutoff. Results indicated that cumulative risk significantly predicted CAPI scores for all three of the cutoffs. Specifically, cumulative risk accounted for 28% of the variance when using the 75% cutoff (i.e., 25th percentile), 21% of the variance using the 85% cutoff

(i.e., 15th percentile), and 22% of the variance using the 95% cutoff (i.e., 5th percentile). (See Table 2 for results).

Discussion

Researchers in the child maltreatment area have proposed several theoretical frameworks to understand how various risk markers are organized and contribute to the prediction of child abuse potential. The current study expands the work of previous researchers by conducting an empirical investigation of two primary theoretical frameworks, namely the developmental-ecological model and the cumulative risk model.

Empirical investigation of the two theoretical models indicated that the cumulative risk model best described the contribution of risk markers included within the study. Specifically, results indicated that the developmental-ecological model, in which risk markers were organized into three separate conceptual domains (i.e., psychological-developmental, immediate, and broader), provided a poor fit to the data. However, examination of the cumulative risk model, which included the total number of risk markers, was significant in predicting child abuse potential, indicating that the accumulation of risk markers was more essential than *which* particular risk markers were endorsed.

These results are consistent with previous literature supporting cumulative risk models when studying general child outcomes. For example, Appleyard et al. (2005) investigated the impact of several risk markers on behavior problems in adolescence, and results indicated that the accumulation of risk markers significantly predicted negative outcomes (e.g., child and adolescent behavior problems). The current study has advanced the child maltreatment literature by applying the cumulative risk model to the prediction of child abuse potential.

Limitations

One major limitation in this study stemmed from the low scores on the CAPI which may have affected positive predictive power. This poses a threat to internal validity of the study, as validity of predictions varies with the base rate of the particular variable of study (Meehl & Rosen, 1955; Maddux & Winstead, 2005, pg. 105). The low CAPI scores are likely due to the low base rate for physical abuse in this community sample. Specifically, actual CPS reports indicated that only 2% of parents in the sample had ever been reported, and only 38% of those reports were substantiated and resulted in further action. As described by Steiner (2003), low base rates increase the risk for false positives, especially when using screening tests such as risk instruments. Thus, low base rates for abuse commission, and thus, child abuse potential, in this population should be considered when interpreting the current findings. Different conclusions may be drawn in other studies with higher base rates of child abuse. Interpretation is further complicated because there are few studies using measures, such as the CAPI, as a proxy for child abuse perpetration. Finally, these findings are specific to parents of children within this age range and generalization to other ages should be done cautiously, which points to the importance of conducting future research in this area.

Methodological limitations must also be considered. First, the observed variables may not have captured the latent constructs as well as originally predicted. Several of the measures were well-validated scales used frequently in the child maltreatment literature (e.g., the Parent Stress Index and the Eyberg Child Behavior Inventory); whereas other scales lacked extensive validation (e.g., the Parental Locus of Control Scale). Further studies should attempt to validate these scales, as it is imperative to have adequate measures of the latent constructs. Second, the study was limited by the primary use of self-report measures; it is thus recommended that future research studies include multi-methods of assessment, such as actual CPS reports, parent-child observations, and reports from collateral informants. In addition, the results may have been

limited by the use of child abuse potential ratings, rather than firsthand reports of abuse from parents or actual CPS referrals. Although the CAPI is the gold-standard risk instrument for child maltreatment, previous results suggest that CAPI scores only account for about 17% of the variance in actual CPS reports (Chaffin & Valle, 2003). Therefore, it is imperative to reiterate that child abuse potential scores may not represent actual occurrence rates, as results cannot be generalized to include actual parental abusive behavior or occurrence of maltreatment. It is also important to note that the present study did not allow for causal interpretations regarding the relations among risk factors and child abuse potential. Longitudinal investigations would allow for examination of the temporal sequencing of risk markers and maltreatment occurrence. In addition, researchers would need to eliminate alternative explanations for associations between risk markers and child abuse potential (Haynes et al., 1993). Finally, the current study is limited to investigation of main effects rather than the interplay of multiple contexts involved in child development.

Implications for Future Research, Policy, and Practice

While results from the current study contribute to the child maltreatment area, further research on risk for child abuse potential is warranted. Specifically, future research should attempt to replicate these findings in additional populations, especially with a broader age range. Given the current study's limitations regarding conclusions about causal relationships among risk factors and child abuse occurrence, it is important that future research incorporate longitudinal designs which would allow for examination of the temporal sequencing of these variables and examination of alternate associations between risk factors and child abuse potential. In addition, researchers should examine the role of mediators, moderators, and interactions within the cumulative risk model, especially given the poor fit of the model including main effects alone. Finally, some of the variables within the study are bipolar in nature and can serve as both risk and promotive markers when investigating the broader scope of child adjustment. Therefore, it may be important for future studies to investigate the impact of these risk markers when endorsed in the opposite direction, as promotive factors, to advance our knowledge on child coping and well-being throughout development.

Research has shown that child maltreatment is linked with an array of negative child outcomes, including serious long-term emotional, cognitive, and physical difficulties (Aber et al., 1989) which place an enormous strain to society in terms of economic cost (Bess, Andrews, Jantz, Russell, & Green, 2002). Thus, it is imperative to reduce rates of child maltreatment by decreasing risk factors and increasing protective or buffering markers, which can be achieved through prevention and intervention strategies.

With evidence supporting a cumulative risk model and a peak in child maltreatment rates between ages 3 and 8 (Egley, 1991), parenting programs designed to target families experiencing multiple risk factors may serve to reduce rates of child maltreatment among preschoolers (e.g., Asawa, Hansen, & Flood, 2008; Turner & Sanders, 2006). In addition, treatments that incorporate risk markers such as parenting stress, parenting satisfaction, and child disruptive behavior, may assist in decreasing child abuse potential (Asawa et al., 2008).

Results from this study are encouraging for child maltreatment interventions, as they provide evidence to suggest that potential for child maltreatment may increase with the presence of multiple risk markers. Thus, developing interventions that target families experiencing a high number of risk factors may assist in reducing future rates of child maltreatment. While identifying 'causal' risk factors may be even more beneficial, evidence for cumulative risk provides interventionists with imperative information for formulating treatments that target multiple risk factors. In other words, if programs can reduce the incidence or accumulation of risk markers experienced by families, this is likely to result in an overall reduced risk for child maltreatment.

Further, since results from the current study suggest that risk markers may range from immediate to broad domains, interventions could include comprehensive programs covering individual, parent, child, and neighborhood characteristics. In addition, this study provides preliminary support for the examination of child abuse potential, allowing health care professionals to target at-risk parents and intervene before an actual CPS report takes place. In sum, findings from this study, supporting a cumulative risk model for child abuse, provide important directions for future research to continue the examination of risk for child abuse and the subsequent development of intervention programs.

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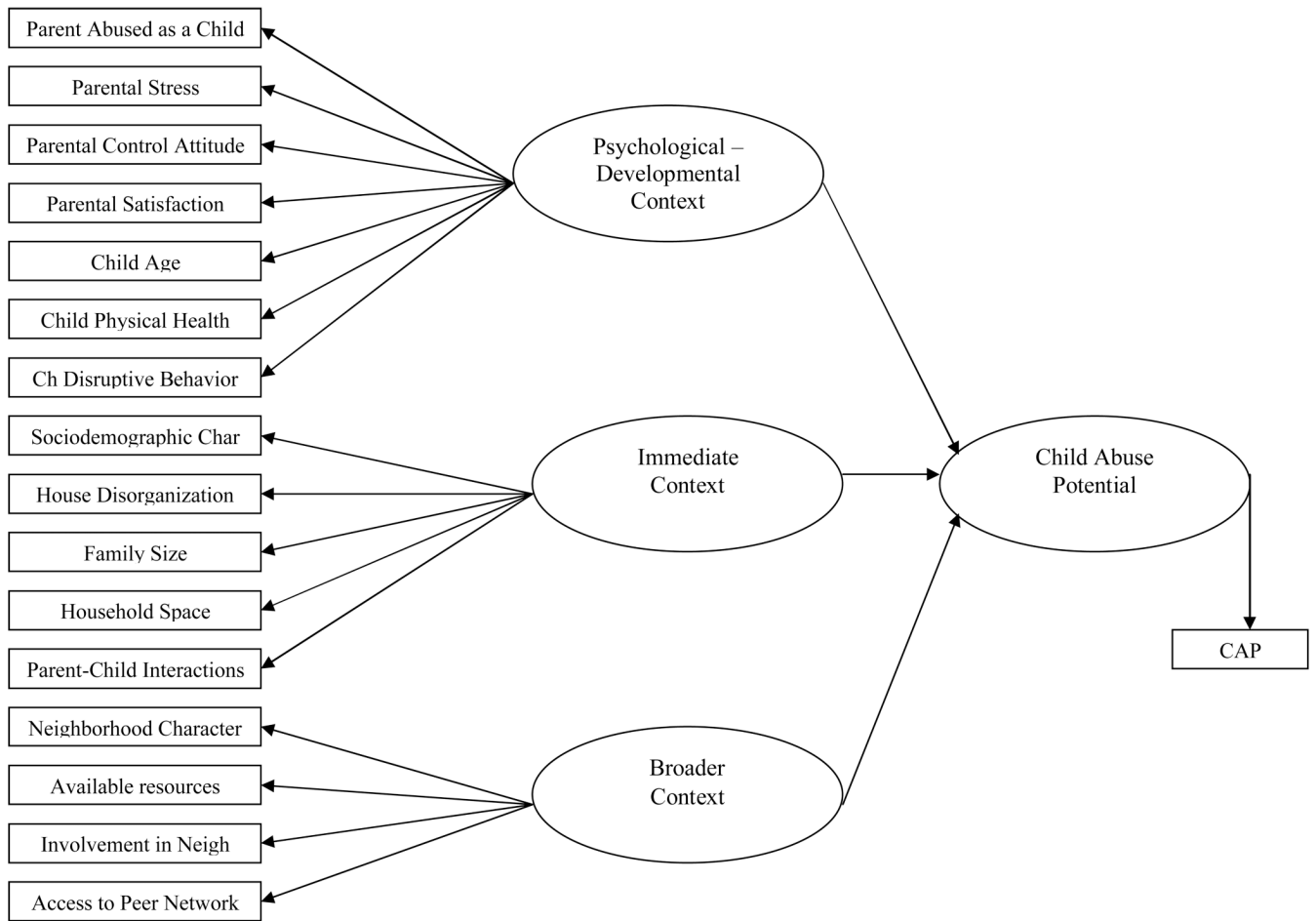


Figure 1.
Developmental-Ecological Model

Table 1

among risk factors (N = 610)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
as a child	1																							
ation	.23**	1																						
l attrib	-.03	.61**	1																					
alth	-.06	-.65**	.56**	1																				
behavior	-.19**	.11**	.10*	.05	1																			
ty	-.47**	-.38**	-.43**	-.38**	-.08*	1																		
l Status	-.00	-.02	.04	-.03	.06	.01	1																	
e Level	-.07	.03	.01	.06	.09*	.05	.15**	1																
Attainment	.01	-.04	-.09*	.01	.00	.02	.11**	.00	.33**	1														
y status	.11**	.09*	-.01	.01	-.00	-.10*	-.03	-.10*	-.36**	-.33**	1													
sorganize	-.16**	-.16**	.07	.06	-.03	.11**	.04	.09*	.45**	.39**	-.57**	1												
interactions	-.16**	-.16**	.09*	.09*	-.02	.04	-.03	.05	.43**	.29**	-.34**	.62**	1											
d characteristics	.07	-.01	-.04	-.04	-.03	-.07	.07	-.06	-.13**	-.02	.11**	-.28**	-.18**	1										
ources	.20*	.42**	-.30**	-.40**	.00	-.07	.37**	.02	-.02	.10*	-.07	-.02	-.09*	.09*	1									
neigh	.06	.07	.00	-.03	.10*	.01	.10	-.05	-.02	-.07	-.22**	-.03	-.14**	.19**	.33**	1								
to peer ntwk	.04	.04	.00	-.00	.10*	.00	-.12	-.11**	-.21**	-.19**	.08*	-.30**	-.29**	.15**	.20**	.54**	1							
	-.16**	-.57**	-.14**	-.15**	.03	-.13**	.12**	.05	-.24**	-.20**	-.39**	-.20**	-.20**	-.35**	.20**	-.08	-.09*	-.19**	1					
	.19**	-.06	.04	.08	.03	-.04	-.05	.04	.04	.04	-.03	.12**	.10*	.10*	.05	-.09*	-.00	.11**	.03	1				
	-.01	-.03	.05	-.02	.07	-.04	-.11**	.02	.02	-.02	-.13**	.02	.00	.08*	.01	.01	-.06	.04	.14	.13**	1			
	-.20**	-.32**	.20**	.19**	.00	.09*	-.13**	.05	-.05	.06	-.22**	.19**	-.04	.07	-.19**	.06	-.05	.21**	-.19**	.01*	.08*	1		
	.49**	.57**	-.45**	-.33**	.02	-.16**	.27**	-.03	-.17**	-.21**	.27**	-.38**	-.35**	.20**	.39**	.04	.13**	-.41**	-.40**	-.10*	.02	-.36**	1	

Table 2

Multiple Regression Predicting Child Abuse Potential – Cumulative Risk Model

	R²	B	Standard error B	F (1, 608)
75% Cutoff – Top 25 th percentile CUMULATIVE RISK	.08	0.28	0.04	52.07***
85% Cutoff – Top 15 th percentile CUMULATIVE RISK	.04	0.21	0.05	18.84***
95% Cutoff – Top 5 th percentile CUMULATIVE RISK	.05	0.22	0.05	21.74***

 $p < .001$