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Psychosocial and Cognitive Functioning of Children with Specific Profiles of Maltreatment

Katherine C. Pears, **Hyoun K. Kim**, and **Philip A. Fisher**
Oregon Social Learning Center, Eugene, OR

Abstract

Objectives—Up to 90% of child welfare system cases involve multiple types of maltreatment; however, studies have rarely incorporated multiple dimensions of maltreatment. The present study employed a latent profile analysis to identify naturally occurring subgroups of children who had experienced maltreatment.

Methods—Reports of maltreatment incidents for 117 preschool-aged foster children were classified along two dimensions: type (e.g., physical abuse, sexual abuse, physical neglect, supervisory neglect, or emotional maltreatment) and severity within type.

Results—The analyses revealed four distinct profiles showing moderate to high levels of maltreatment: (a) supervisory neglect/emotional maltreatment, (b) sexual abuse/emotional maltreatment/neglect (both supervisory and physical), (c) physical abuse/emotional maltreatment/neglect, and (d) sexual abuse/physical abuse/emotional maltreatment/neglect. Profile membership was examined with respect to the children's cognitive functioning and externalizing and internalizing problems: lower cognitive functioning was related to profiles with neglect or physical abuse (or both), externalizing was highest in the sexual abuse/physical abuse/emotional maltreatment/neglect profile, and internalizing was highest in the profiles with physical or sexual abuse (or both).

Conclusions—There appear to be distinct profiles of maltreatment among preschoolers that have differential associations to measures of adjustment. Policy and practice implications and future research directions are discussed.

Practice Implications—Using different profiles of maltreatment to understand specific vulnerabilities may guide in tailoring interventions to the needs of maltreated children.

Keywords

maltreatment; classification; latent profile analysis; outcomes

Child maltreatment is associated with a wide range of negative outcomes, including high rates of cognitive, emotional, and psychosocial impairment (Bolger & Patterson, 2001; Bolger, Patterson, & Kupersmidt, 1998; English et al., 2005; Manly, Cicchetti, & Barnett, 1994). Traditionally, there have been two major approaches to studying the effects of maltreatment. The first approach has involved the study of maltreated children using samples from populations such as the child welfare system, in which some form of maltreatment is likely to have occurred, without differentiating among the subtypes or severity of maltreatment (Main & George, 1985; Oates, Forrest & Peacock, 1985). This work has provided a critical evidence base documenting the overarching negative effects of maltreatment. The other approach has

Reprint requests should be addressed to the corresponding author, Dr. Katherine C. Pears: Oregon Social Learning Center, 10 Shelton McMurphey Boulevard, Eugene, OR 97401, Phone: (541) 485-2711, Fax: (541) 485-7087, E-mail: katherinep@oslc.org.

involved the identification of individuals who have experienced a specific type of maltreatment of interest (although they may have experienced additional types) and who are then compared to nonmaltreated individuals (Eckenrode, Laird, & Doris, 1993; Kaufman & Cicchetti, 1989; Klimes-Dougan & Kistner, 1990; Price & Glad, 2003; Taussig & Litrownik, 1997).

Although these approaches have led to advances in the field, both consider maltreatment as a unidimensional phenomenon. By classifying children as victims of nonspecific maltreatment or of one specific type of maltreatment, these approaches do not address the possibility that children have experienced multiple types of maltreatment. However, as Lau et al. (2005) noted in a recent review, 46–90% of child welfare system cases involve multiple types of maltreatment. Similarly, results from a national survey of youth victimization (Finklehor, Ormrod, Turner, & Hamby, 2005) showed that 69% of the children who had experienced direct or indirect victimization in the prior year had experienced multiple incidents and had been subjected to an average of three types of victimization.

Given that the co-occurrence of multiple types of maltreatment appears to be relatively commonplace, studies focusing on only one type of maltreatment in a child's history might limit efforts to examine differential outcomes as a function of type of maltreatment. For example, when groups of maltreated children have been compared, physical abuse has been linked to increased externalizing symptoms and aggression towards others (Eckenrode et al., 1993; Kaufman & Cicchetti, 1989; Klimes-Dougan & Kistner, 1990; Taussig & Litrownik, 1997) and to internalizing symptoms (English et al., 2005; Trickett & McBride-Chang, 1995). Likewise, sexual abuse has been linked to externalizing and internalizing symptoms (Litrownik et al., 2005; Manly, Kim, Rogosch, & Cicchetti, 2001), and neglect has been associated with internalizing symptoms (English et al., 2005; Manly et al., 2001).

This seeming lack of specificity in outcomes might signify that specific types of maltreatment do not lead to specific sequelae. Rather, maltreatment in general might simply confer greater risk for all kinds of psychosocial difficulties. On the other hand, given that the experience of a single, specific type of maltreatment is not the norm for most maltreated children, it is likely that different combinations of maltreatment experiences produce differential outcomes. Thus, in addition to knowing that a child has experienced physical abuse, it may be necessary to determine what other types of maltreatment co-occurred with the physical abuse and to what degree.

To determine if considering multiple maltreatment types leads to better prediction of outcomes than considering only a single maltreatment type, Lau et al. (2005) sorted a group of 519 children involved in a national longitudinal study of child abuse and neglect in three ways: (a) according to a hierarchical classification system in which sexual abuse was coded above physical abuse, physical abuse above neglect, and neglect above emotional maltreatment; (b) according to the most severe type of abuse that the child had experienced; and (c) according to a scheme of six categories that included single types and combinations of types of maltreatment (called “expanded categories”). Classifying children using the expanded categories resulted in better prediction than schemes that classified children according to only one predominant type of abuse. Further, type of abuse appeared to have predictive ability even after accounting for whether a child had experienced multiple types of maltreatment. Thus, it appears that classifying children by multiple maltreatment experiences, instead of a single type, may be a more powerful predictor of children's later adjustment.

The sequelae of maltreatment are likely to depend not only on the type of abuse experienced but also on the severity of that abuse. For example, a child who experiences a limited time period of not having enough food to eat may have very different outcomes than a child who suffers prolonged physical neglect including the lack of food, clothing, and adequate medical

care, although both children would be classified as having experienced physical neglect. Greater total severity of maltreatment has been linked to poorer outcomes (Litrownik et al., 2005; Manly et al., 1994), and considering the severity of each type of maltreatment that a child has experienced appears to lend greater power in predicting outcomes (Manly et al., 2001). Among the different ways of quantifying severity of maltreatment, ratings of severity within each specific maltreatment subtype appear to provide the most power in predicting to outcomes (English et al., 2005; Litrownik et al., 2005).

The studies mentioned above and others (Bolger & Patterson, 2001; Manly et al., 1994; Smith & Thornberry, 1995) have made great strides in clarifying associations between various dimensions of maltreatment and differential outcomes. Some of these studies, such as that by Lau et al., have also examined groupings of multiple maltreatment types within populations of maltreated children. However, for the most part, they have tended to approach the classification of maltreatment type categorically. Thus, although they have accounted for multiple maltreatment types, they have not simultaneously examined severity within those types.

One exception to this is a study by Bolger and Patterson (2001) in which a factor analysis was performed to explore the associations among different types of maltreatment using severity within subtype scores for five types of maltreatment. They found that physical abuse and emotional maltreatment loaded on one factor, failure to provide (physical neglect) and lack of supervision (supervisory neglect) on another, and sexual abuse on a third. The Bolger and Patterson study is notable for its attempt to statistically validate different groupings of multiple maltreatment types using continuous ratings of severity within type. However, in factor analysis, the associations among multiple variables are examined with the goal of grouping these variables into factors. This variable-centered method indicates the associations among different variables. In such an approach, individuals can be assigned scores on each of the resulting factors but cannot be grouped into discrete and mutually exclusive categories (based on having had similar experiences) that can be linked to specific outcomes.

In contrast, latent profile analysis (LPA; B. Muthén, 2001) allows for the classification of individuals who are similar on observed variables into groups using a categorical latent variable. Thus, LPA makes it possible to retain the continuous nature of severity ratings of maltreatment while considering multiple dimensions of the child's reported maltreatment history. In comparison with traditional factor analysis, LPA avoids the use of arbitrary cut-off points on underlying dimensions and provides statistical criteria for determining the best solution. Classification of individuals is provided directly by the model through the use of probabilities of profile membership for each individual for each profile: individuals can be assigned to the class for which they have the highest probability of membership. Thus, LPA can be used to identify maltreatment profiles based on the underlying, naturalistic groupings of the people in a population rather than on associations between the items used to assess those people. Further, the probability of group membership being associated with specific background or outcome variables can be determined (see B. Muthén & Muthén, 2000), making it possible to link different maltreatment profiles with specific sequelae.

By identifying heterogeneous subgroups of maltreated children based on multiple dimensions of their experiences, LPA presents the opportunity to refine knowledge of the sequelae of various maltreatment experiences. Better prediction of outcomes could in turn lead to treatments that are tailored to the needs of individuals with given profiles. The importance of this sort of person-centered approach to the refinement of mental health service provision was recently demonstrated by McCrae, Chapman, and Christ (2006). Using LPA, they examined profiles of children who had experienced sexual abuse based on the severity and duration of that abuse and on a number of other family factors. Children who have been sexually abused are the most likely to be referred to and receive mental health services, and McCrae and

colleagues demonstrated that referral to and receipt of services by these children was based almost wholly on whether there was a substantiated report of sexual abuse. However, by identifying distinct profiles of sexually abused children and linking specific mental health outcomes to these profiles, McCrae and colleagues showed that only some groups of sexually abused children exhibited significant mental health problems.

The results from the McCrae et al. (2006) study strongly illustrate the need for better understanding of the heterogeneity in children's maltreatment experiences to guide policy governing service delivery to these children. Better specification of subgroups within the population might also contribute to prevention efforts by allowing for the identification of specific etiologic pathways for particular profiles of maltreatment. Ultimately, a better understanding of heterogeneity in maltreatment experiences and the different sequelae associated with different profiles of maltreatment could help to improve outcomes for children.

Overview of the Study

The present study had two goals: (1) to examine, through LPA, whether it was possible to identify naturally occurring subgroups of children based on maltreatment type and severity within type; and (2) to determine whether children with specific maltreatment profiles showed differential patterns of psychosocial adjustment and cognitive functioning. LPA was used to classify children into groups. LPA may be used as an exploratory tool for identifying heterogenous groups within a subpopulation (Belsky & Fearon, 2004) or to confirm hypotheses about the clustering of characteristics such as symptoms of disorders (Volk, Henderson, Neuman, & Todd, 2006). Only one other study to date has used latent class analysis (a method closely related to LPA) to examine groups of different maltreatment types (Romano, Zoccolillo, & Paquette, 2006), and they used a dichotomous measure to indicate whether abuse of each given type had occurred. As is noted above, McCrae and colleagues (2006) also used LPA to identify profiles of sexually abused children. However, as the present study used LPA with continuous measures to examine profiles of multiple types of maltreatment, a more exploratory approach was taken. It was hypothesized that heterogeneous groups of children would emerge from the analysis of the larger population of maltreated preschoolers.

Once classified according to maltreatment profiles, the children were examined on three outcomes for which groups of maltreated children have previously been shown to differ from their nonmaltreated peers: cognitive functioning, externalizing behavior, and internalizing behavior. After considering the classes that emerged from the LPA, a series of predictions about potential profile differences in the outcomes was made based on previous research. Where hypotheses were not borne out, post-hoc analyses were employed to determine where group differences lay.

Method

Participants

The sample included 117 maltreated foster children (63 males) in a medium-sized metropolitan area in the Pacific Northwest. All children between the ages of 3 and 6 entering new foster placements within a 4-year period (2000–2003) were referred to a randomized efficacy trial of Multidimensional Foster Care for Preschoolers (MTFC-P; Fisher, Gunnar, Chamberlain, & Reid, 2000) through the local child welfare system. This included children new to foster care, children reentering foster care, and children moving between foster placements. Inclusion criteria also specified that the child be placed in a nonrelative foster home, be expected to remain in foster care for at least 3 months, and not be taking medication that might affect cortisol levels (one aim of the larger study was to examine salivary cortisol in the children) and that the child and foster family have English as a first language.

Once eligibility was established and children were randomized to study conditions (intervention or comparison group), a staff member contacted the child's caseworker (i.e., the legal guardian while the child is in care) and requested consent for the child to participate in the project. Whenever possible, a staff member also sought birthparent assent for the child's participation. With the caseworker's permission, a staff member then contacted the foster parent (s) to schedule a home visit to explain the study and invite them to participate. To be successfully recruited, the caseworker and the foster family had to consent to participation. Of the 137 children who were randomized for possible participation in the study, 117 (85%) participated. The most common reasons for nonparticipation were the foster parents being too busy or the caseworker being concerned about the child's participation. There were no significant differences on age and gender between participating and nonparticipating children. Families who agreed to participate were compensated for their involvement in data collection activities. As is noted above, all participating children were enrolled in a randomized efficacy trial of MTFC-P; however, because the measures discussed in this article were taken before the intervention began and because preliminary analyses indicated that there were no between-group differences on the outcome variables included in this article, group assignments have not been considered here.

Children had spent an average of 170 days in foster care prior to entry into the study (range = 17–860 days), had experienced an average of 3 prior foster placements (range = 1–8), and had a mean age of 4.43 years (*SD* = 0.85). The ethnicity breakdown of the sample was representative of the local community: 87% European American, 7% Latino, 5% Native American, and 1% African American. There were a number of sibling groups in the sample: 14 dyads, 3 triads, and 1 tetrad. As is described below, all analyses employed statistical techniques to account for the nonindependence of observations.

Measures

Children's lifetime maltreatment histories prior to study entry were coded from child welfare system case records. The outcome measures for the present study were obtained from the children and their foster parents in laboratory and home-based assessments that occurred over a 4-week interval an average of 4 weeks after study entry. All procedures were developed in partnership with the local and state child welfare agencies and were approved by the Institutional Review Board of the research center at which this study was conducted.

Maltreatment history—The children's experiences of maltreatment were coded from case records using the Maltreatment Classification System (MCS; Barnett, Manly, & Cicchetti, 1993). The MCS allows for the coding of different types of maltreatment: physical abuse, sexual abuse, failure to provide (i.e., parental failure to provide adequate food, clothing, shelter, medical care, or a safe living environment for the child; referred to as *physical neglect* in this article), lack of supervision (i.e., parental failure to provide age-appropriate supervision for the child; referred to as *supervisory neglect* in this article), emotional maltreatment (i.e., parental rejection, abandonment, or allowing the child to be witness to traumatic events), educational maltreatment (i.e., parental failure to send the child to school), and moral/legal maltreatment (i.e., parents using the child for illegal purposes). Severity ratings were also obtained for each maltreatment type within each maltreatment incident using a scale from 1 (*less serious maltreatment*) to 5 (*severe or potentially life-threatening maltreatment*). With regard to physical abuse, for instance, a score of 1 indicates that minor marks had been left on the child's body (but not neck or head), whereas a score of 5 would indicate that the caregiver had inflicted an injury on the child that required hospitalization and/or was permanently disabling or disfiguring. Children who did not experience a particular maltreatment type for a given maltreatment incident received a score of 0 for that category. The relationship to the child of the perpetrators (up to three) of each maltreatment incident was also coded.

Case records were obtained with consent from the caseworkers and the local child welfare agency. A representative of the child welfare agency, who was paid a stipend by the research center, prepared the case files prior to coding, eliminating identifying information from the files. The resulting coding files were kept in a locked drawer at all times. Coders signed confidentiality agreements and completed extensive training on confidentiality. Files consisted of caseworker narratives of each referral to the child welfare system and the resulting investigation and findings. Narratives contained information about the specific types of maltreatment that were reported and investigated (if there was a subsequent investigation) for a given referral but did not necessarily contain information on the presence or absence of each type of maltreatment coded within the MCS. Using these narratives, coders identified discrete maltreatment incidents because caseworkers would sometimes describe the investigation of two separate reports of maltreatment in the same narrative. To qualify as an incident, an event had to fit the MCS definitions of maltreatment and had to be reported by a reliable (i.e., mandatory) reporter or to be founded by the caseworker. Each maltreatment incident was then classified according to type and coded for severity using the MCS.

Case records were coded by two coders who had been trained in the use of the system by one of the MCS authors (Manley). During data collection, 20% of the case records were double-coded for the purposes of computing interrater agreement. Agreement on the identification of incidents was high (80%), and inter-rater agreement was similarly high for the severity of each type of abuse. The average kappa was .72 across all of the categories (physical abuse $\kappa = .82$, sexual abuse $\kappa = .67$, failure to provide $\kappa = .65$, lack of supervision $\kappa = .65$, emotional maltreatment $\kappa = .79$).

Preliminary analyses indicated that the base rates for the categories of educational maltreatment (because the children were under school age) and moral/legal maltreatment were extremely low. Thus, these two categories were dropped from further score calculation and analyses. To obtain total mean severity scores for each category of maltreatment, all of the severity scores within each type of maltreatment across incidents were averaged. This resulted in five mean severity scores for physical abuse, sexual abuse, physical neglect, supervisory neglect, and emotional maltreatment.

Composite score measures—Multiple indicators from multiple agents were used to build composite scores to measure outcomes and variables of interest. In creating the composites, the two criteria specified by Patterson and Bank (1986) were used: (a) the scales included in the composite had to show acceptable internal consistency (i.e., $\alpha \geq .60$ and item-total correlation = .20, $p < .05$) and (b) the scales had to converge with other indicators designed to assess the same domain (i.e., factor loading for a 1-factor solution $\geq .30$). Scales that met the above reliability criteria were standardized and aggregated by computing the mean to form the composite scores described below. See Table 1 for information on the specific scales used to form each composite score and the reliability coefficients for the composite scores.

The *cognitive functioning* composite score included scales from measures of the child's cognitive functioning, neuropsychological functioning, and language development: Wechsler Preschool and Primary Scales of Intelligence–Revised (Wechsler, 1989), NEPSY: A Developmental Neuropsychological Assessment (Korkman, Kirk, & Kemp, 1998), and Preschool Language Scale–Third Edition (Zimmerman, Steiner, & Pond, 1991). Scale scores were standardized and averaged.

The *externalizing problems* composite score included measures of the child's externalizing behaviors from the parent-related Early Childhood Inventory (Gadow & Sprafkin, 1994), Child Behavior Checklist (Achenbach, 1991), and Emotion Regulation Checklist (lability/negativity scale; Shields & Cicchetti, 1997). The lability/negativity scale from the Emotion Regulation

Checklist was calculated from ratings completed by caregivers (α = .88), laboratory assessors (α = .91), and home observers (α = .90). For the laboratory assessments, only ratings for the first two of four possible visits were used to prevent intervention effects from influencing the children's scores. The interviewer ratings from those two visits were significantly intercorrelated (*r* = .54); thus, an average of laboratory interviewer ratings was created. The Early Childhood Inventory and Child Behavior Checklist scores and the parent, home observer, and laboratory observer ratings of lability/negativity scale from the Emotion Regulation Checklist were standardized and averaged.

The *internalizing problems* composite score included items measuring anxious behaviors from the parent-related Early Childhood Inventory and the Child Behavior Checklist. These scores were standardized and averaged.

Analysis Plan

The goal of LPA is to identify the optimal number of latent profiles that adequately describe the associations among the observed variables. In the present study, the latent profiles represented subgroups of children who had experienced similar patterns of maltreatment, and the observed variables represented the severity level for each maltreatment type. Profiles were added stepwise until the best fitting model with theoretically meaningful profiles was obtained. The profiles were then examined in terms of their mean severity scores on each maltreatment type. Next, LPA models predicting to the outcomes of cognitive functioning, externalizing problems, and internalizing problems were run. For each outcome, a series of nested models was analyzed to examine subgroup differences in these outcomes. This approach was chosen based on recent recommendations by B. Muthén (2004) that, when predicting to distal outcomes from profile membership, models including both the profile indicators and the outcomes should be used (vs. ANOVA or logistic regression). Running nested models allowed for correct estimation of standard errors and provided an additional check on the stability of the profiles. LPA was conducted using Mplus Version 4.2 (L. K. Muthén & Muthén, 2007). To take into account the interdependence of sibling data, models were estimated using maximum likelihood with robust standard errors, which compute standard errors and a chi-square that are robust to nonnormality and nonindependence of observations (L. K. Muthén & Muthén, 2007).

Results

Descriptive Analyses of the Maltreatment Coding

As is shown in Table 2, about one third of the sample had experienced physical or sexual abuse. In addition to the means for the whole sample, the means and ranges for the sample when children with no occurrences of a given maltreatment type (severity score of 0) were excluded are presented in the table. This was done to more accurately reflect the seriousness of maltreatment (vs. the lack of reports of a given maltreatment type). The majority of the sample experienced moderately severe physical neglect, supervisory neglect, or emotional maltreatment. Children experienced an average of seven maltreatment incidents perpetrated by an average of three people: 58% biological mothers, 26% biological fathers, 2% female relatives, 2% male relatives, 1% female nonrelatives, 9% male nonrelatives, and 2% unknown. The presence of multiple maltreatment types was typical: children experienced an average of three different maltreatment types overall. In fact, 95% of the sample had experienced more than one type of maltreatment, which is higher than has been reported in other samples of maltreated children (Lau et al., 2005;Manly et al., 2001). This higher percentage might reflect the fact that only foster children were included in the present study, whereas foster care status varied in samples with lower percentages of multiple maltreatment types.

LPA—The mean severities of physical abuse, sexual abuse, physical neglect, supervisory neglect, and emotional maltreatment for the entire sample were entered into a series of LPA models. The Bayesian information criteria (BIC) statistics, log likelihoods, Lo-Mendell-Rubin (L-M-R) test *p* values, and entropy values for the 2–5 profile models are presented in Table 3. To determine the optimal number of latent profiles, the BIC, which balances goodness of fit with parsimony, was used (B. Muthén & Muthén, 2000;Nagin, 1999). The BIC has been shown to be the best indicator for determining the optimal number of profiles in LPA when compared with other information criteria such as the Akaike information criterion, the consistent Akaike information criterion, and the sample adjusted BIC (Nylund, Asparouhov, & Muthén, in press). Typically, the chosen model has the smallest BIC or the smallest decreases in the BIC as profiles are added. When the BIC stops decreasing or increases, this suggests that the solution with the best fitting number of classes has been reached. Similarly, the L-M-R *p* value indicates whether the model being tested is a significantly better fit to the data than a model with one less profile. In conjunction with the statistical indicators, following McCrae et al. (2006), two substantive indicators of model fit also were used: (a) the amount of new information provided with the addition of profiles, and (b) the number of participants in added profiles. We reasoned, as did McCrae et al., that profiles including 5% or less of the total sample were too small and potentially unstable for the purposes of comparisons.

In LPA, the stability of the profiles is also a factor for consideration. In the present study, all of the models were tested using 10,000 different starting values. As was suggested by L. K. Muthén & Muthén (2007), we examined patterns of fluctuations in log likelihood values and the number of profile counts to verify that the final model had reached a stable trustworthy solution.

As can be seen in Table 3, the BIC decreased steadily up to the four-profile solution and then increased with the five-profile solution. The L-M-R *p* value indicated that the two-profile solution was a significantly better fit than the one-profile solution. This was not the case for the three-profile solution. The L-M-R *p* value was marginally significant for the four-profile solution, indicating a better fit than the three-profile solution. For the five-profile solution, the BIC increased slightly, and the L-M-R *p* value indicated that it was not a better fit than the four-profile solution. Entropy was acceptable for all of the models.

We chose the four-profile solution for further analyses because the BIC continued to decrease until the four-profile solution was reached, the L-M-R *p* value indicated that this was a better fit than the three-profile solution, and all four of the groups contained more than 5% of the sample (two groups in the five-profile solution would have included less than 5% of the sample). The L-M-R *p* value suggested that the two-profile solution might be a better fit. However, a comparison of the two-versus four-profile solutions showed that the two-profile solution would have separated the sample into a group in which there had been moderate to high levels of physical neglect, supervisory neglect, and emotional maltreatment (but little sexual and physical abuse) and a group in which there were moderate levels of physical neglect, supervisory neglect, and emotional maltreatment as well as sexual and physical abuse. By contrast, the four-profile solution offered the possibility to further distinguish between groups of children who had primarily experienced either physical abuse or sexual abuse in addition to physical and supervisory neglect and emotional maltreatment as well as a group who had experienced moderate to high rates of all types of maltreatment. Further examination also indicated that the four-profile solution would provide theoretically important and substantively meaningful distinctions.

Using LPA, an estimated probability for belonging in each of the profiles (posterior probability) was generated, and individuals were assigned to the profile to which they are most likely to belong based on these probabilities. The average posterior probability for most likely latent

profile membership ranged from .99 to 1.00 for the four profiles, suggesting that profile determination was very good.

The severity levels for each maltreatment type are presented by profile in Figure 1. As is demonstrated in the figure, there was considerable variation in the severity of physical and sexual abuse across profiles, although there was also variation in the severity of physical neglect, supervisory neglect, and emotional maltreatment. Naming groups, especially those in which multiple dimensions are being considered simultaneously, is always challenging, as one must weigh the need for specificity against the need for parsimony. In this case, the profile names were based on the maltreatment types that reached a mean severity of 2, indicating that the child experienced physical harm, a direct request for sexual contact, consistent neglect, or rejection (labeled here as "moderate" severity), or that reached mean severity levels of 3, indicating that the child was seriously injured, experienced direct sexual contact, was neglected to the point of danger to self, or was subjected to a consistent pattern of hostility and negativity (labeled here as "high" severity). (Had there been means of 4 or 5, they would have been labeled as "severe," indicating that the child experienced serious injuries, had experienced total abandonment, or was killed.) Thus, names feature only those types of maltreatment for which the child received a mean score of at least 2. In the interest of brevity, if the levels of supervisory and physical neglect were similar (i.e., both moderate) they were collectively referred to as "neglect" without further specification as to type.

The first profile (n = 73) was labeled "supervisory neglect/emotional maltreatment" because these two maltreatment types were higher relative to the other categories *in this profile*. Relative to the other three profiles, there were lower levels of physical neglect and virtually no physical or sexual abuse. The second profile (n = 14) was labeled "sexual abuse/emotional maltreatment/neglect" because the children in this profile had the highest level of emotional maltreatment and one of the highest levels of sexual abuse relative to the other profiles, though their levels of neglect were moderate and comparable to those in the other classes. There was almost no physical abuse in this profile. The third profile (n = 19) was labeled "physical abuse/neglect/emotional maltreatment" because the children had experienced moderate levels of such maltreatment. It was distinguished from the other classes primarily because of the relatively high levels of physical abuse and very low level of sexual abuse. The fourth profile (n = 11) was labeled "sexual abuse/physical abuse/emotional maltreatment/neglect" because the children had experienced all of the maltreatment types at moderate to high levels.

Group Differences on Outcome Variables

The four maltreatment profiles were compared on three outcomes: cognitive functioning, externalizing problems, and internalizing problems. Means for each outcome are shown in Table 4 by group. Because the distribution for internalizing was significantly skewed, the values were log transformed.

After the profiles had been identified, a series of predictions about potential differences between the groups on the variables were made based on previous research. Prior research has most often linked neglect to poor cognitive outcomes (Eckenrode et al., 1993). Because all of the profile groups showed at least moderate neglect, it was hypothesized that the children who had experienced supervisory neglect and emotional maltreatment but low levels of physical neglect, physical abuse, and sexual abuse might fare better than the children who had experienced neglect in addition to moderate to high levels of other types of maltreatment. Thus, it was predicted that the supervisory neglect/emotional maltreatment group would have higher cognitive functioning scores than any of the other groups. As is noted above, research has been mixed as to whether different levels of externalizing problems might be expected in children who have experienced physical versus sexual abuse (English et al., 2005). It was predicted that children who experienced moderate to high levels of physical or sexual abuse would have

higher levels of externalizing problems than children who had not had such experiences. The supervisory neglect/emotional maltreatment group was expected to show lower levels of externalizing than the other groups. Because research has been equivocal as to whether internalizing problems are associated differentially with physical or sexual abuse (Kendall-Tacket, Williams, & Finkelhor, 1993), similar predictions were made for internalizing problems, with the supervisory neglect/emotional maltreatment group expected to show lower levels of internalizing than the other groups.

A series of nested models was run for each outcome (see Figure 2). Models in which different group means were not constrained (depending on the prediction) were tested against a model in which all means were constrained to be equal. Model fit was tested using the chi-square value obtained by multiplying the difference between the log likelihoods of the two models by −2; this value was adjusted to account for the interdependence of sibling data in the sample (B. Muthén & Muthén, 2000). If the a priori hypotheses were not tenable, post-hoc analyses were conducted to better understand group differences. For these post-hoc analyses, decisions about which groups to compare on each of the outcome variables were based on post-hoc examinations of the group means.

Cognitive functioning—It was hypothesized that the supervisory neglect/emotional maltreatment group would have a higher mean score on cognitive functioning than the other groups. First, a model was tested in which the means for the other groups were held equal and the mean for the supervisory neglect and emotional maltreatment group was allowed to vary. This model was not a significantly better fit than the model where the means for all groups were held equal, $\Delta\chi^2(1) = 0.34$, *ns*. After examining the means, the comparison was tested in which the sexual abuse/emotional maltreatment/neglect group had higher scores than the other groups. This model showed a significantly better fit than the equal means model, $\Delta\chi^2(1) = 6.08$, $p < .05$. This was the most parsimonious model that fit significantly better than the equal means model.

Externalizing problems—It was hypothesized that the supervisory neglect/emotional maltreatment group would have a lower mean externalizing score than the other groups. This model did not show a significantly better fit than the equal means model, $\Delta\chi^2(1) = 3.76$, *ns*. An examination of the means showed that children in the sexual abuse/physical abuse/emotional maltreatment/neglect group had the highest externalizing scores relative to the other groups. A model was thus tested in which the means of the other groups were constrained to be equal and the mean of the sexual abuse/physical abuse/emotional maltreatment/neglect group was allowed to vary. This model showed a significantly better fit than the equal means model, $\Delta\chi^2(1) = 4.60$, $p < .05$. This was the most parsimonious model that fit significantly better than the equal means model.

Internalizing problems—It was hypothesized that the supervisory neglect/emotional maltreatment group would have a lower mean internalizing score than the other groups. This model was a significantly better fit than the equal means model, $\chi^2(1) = 7.22$, $p < .05$. For all groups except the supervisory neglect/emotional maltreatment group, the internalizing means were almost identical (see Table 4).

Discussion

In a commentary on the advances in measurement of child maltreatment, Manly (2005) noted that, “because of the high frequency of multiple subtype co-occurrence, research on maltreatment requires a well-conceptualized and empirically sound rationale for handling comorbidity to prevent it from obfuscating distinctions among subtypes and the relative contributions of each” (p.432). The present study represents a step towards understanding

profiles of multiple maltreatment types and severity and the differential outcomes associated with these profiles.

Consistent with prior research (Lau et al., 2005; Manly et al., 2001), the maltreated children in this sample had experienced multiple types of abuse (3 on average) ranging in severity from less serious to potentially life-threatening. One of the main aims of the present study was to determine if it is possible to discern meaningful profiles of maltreatment out of these children's myriad experiences. LPA was used to identify four substantively meaningful profiles of maltreatment that differed in terms of maltreatment type and severity.

Children in all groups had experienced moderate to high levels of physical or supervisory neglect and emotional maltreatment. This underscores the near universality of the experiences of neglect and emotional maltreatment among maltreated foster children. However, the types of neglect that co-occurred with other forms of maltreatment varied. Children in the moderate supervisory neglect/emotional maltreatment group had the second highest scores on emotional maltreatment relative to children in the other groups and moderate levels of supervisory neglect. Thus, the primary maltreatment in this group appears to be related to parental failures to supervise or give the child consistent nurturing care rather than the commission of harmful acts towards the child. In this group, the level of *physical* neglect was lower relative to the other groups. In contrast, there were higher levels of physical neglect in the other groups, in which there were also moderate to high levels of physical or sexual abuse. This suggests that physical neglect may co-occur with forms of maltreatment that involve acts of commission and are more likely to have physical impacts on the child. Additionally, this validates the distinction between supervisory and physical neglect and suggests that they might have qualitatively different correlates and sequelae.

Children in the other groups all experienced moderate to high levels of physical abuse or sexual abuse (or both) in addition to emotional maltreatment and neglect. However, the distinctions between groups were not based solely on the presence of physical or sexual abuse versus neglect. In fact, children in most of the groups had experienced some physical or sexual abuse (or both), although often at very low severities. Additionally, as is discussed above, neglect and emotional maltreatment co-occurred with physical and sexual abuse at different levels across the groups. These findings underscore the fact that groups were not distinguishable solely due to the presence or absence of one or two maltreatment types. Rather, different levels of severity of different maltreatment types clustered together to create unique profiles.

The second goal of the study was to examine differences between the identified profiles on three domains that have been associated with maltreatment: cognitive functioning, externalizing problems, and internalizing problems. It was expected that children who had experienced physical or sexual abuse (or both) in addition to neglect and emotional maltreatment would fare worse on measures of cognitive functioning than children who had primarily experienced supervisory neglect and emotional maltreatment. However, this was not the case. Surprisingly, children in the supervisory neglect/emotional maltreatment group did not differ from children in the physical abuse/emotional maltreatment/neglect and the sexual abuse/physical abuse/emotional maltreatment/neglect groups. Rather, children in the sexual abuse/emotional maltreatment/neglect group had the highest mean scores on cognitive functioning relative to children in the other three groups. This finding is consistent with other studies that have shown children who have primarily experienced sexual abuse to exhibit higher academic achievement and grades than children who have experienced other forms of maltreatment (Eckenrode et al., 1993; Buckle, Lancaster, Powell, & Higgins, 2005). However, in spite of the fact that children with higher levels of sexual abuse and emotional maltreatment scored better on cognitive functioning relative to their maltreated peers, sexual abuse has serious consequences in other domains (Kendall-Tacket et al., 1993) as evidenced in the present

study by the high internalizing scores of children in this group relative to children in the supervisory neglect/emotional maltreatment group.

As is noted in the introduction, prior research produced conflicting findings as to whether physical and sexual abuse lead to different types of behavior problems perhaps because some previous studies classified children into only one maltreatment category even though they might have experienced multiple types. Given that studies have linked both types of abuse to externalizing and internalizing behaviors, it was predicted that children in the supervisory neglect/emotional maltreatment group (who had very low levels of physical and sexual abuse) would have lower scores on externalizing and internalizing than children in the other three groups. This was the case for internalizing; compared to children in the supervisory neglect/emotional maltreatment group, children in the other three groups had significantly higher and similar mean levels of internalizing behaviors. This finding is somewhat contrary to that of another study that used LPA to identify profiles of maltreatment and psychiatric disorder (Romano et al., 2006), in which it was found that sexual abuse was highly and specifically associated with depression in pregnant adolescents. However, in that study, depression was a predictor rather than an outcome of profile membership, and the participants were older than those in the present study.

The hypothesis that groups that had experienced higher levels of physical or sexual abuse (or both) would have higher externalizing levels than the supervisory neglect/emotional maltreatment group was not confirmed. Instead, the sexual abuse/physical abuse/emotional maltreatment/neglect group showed the highest mean levels of externalizing, and the other three groups did not differ from one another. Particularly noteworthy about these findings are the similarities between the children with histories of moderate to high physical or sexual abuse (but not both) on measures of externalizing and internalizing behavior problems.

Taken together, these results suggest that children in the sexual abuse/physical abuse/emotional maltreatment/neglect group are at risk for externalizing problems, internalizing problems, and poor cognitive functioning. Children in the sexual abuse/emotional maltreatment/neglect group appear to do relatively well in terms of cognitive functioning but are at higher risk for internalizing problems relative to children in the supervisory neglect/emotional maltreatment group. Also at higher risk for internalizing problems were children in the physical abuse/emotional maltreatment/neglect group. These children also showed lower cognitive functioning than their primarily sexually abused and neglected peers. At lowest risk were the children in the supervisory neglect/emotional maltreatment group. They showed difficulties with cognitive functioning, performing worse than children in the sexual abuse/emotional maltreatment/neglect group.

It should be noted that, although children in the supervisory neglect/emotional maltreatment group had better scores on most of the measures of adjustment relative to children in the other groups, neglect has serious negative consequences. Numerous studies have demonstrated that, compared to nonmaltreated children, children who have experienced neglect show delays in a variety of domains, including cognitive and social development (Eckenrode et al., 1993; Kaufman & Cicchetti, 1989) and physical growth (Pears & Fisher, 2005). The results from the present study simply suggest that children in this group might not fare *as poorly as* children who have experienced physical or sexual abuse (or both) in addition to neglect.

Qualifications and Limitations

Because the children in this study showed higher rates of co-occurrence of maltreatment types than children in other studies, this sample might represent a population with more severe forms of maltreatment than are typically included in maltreatment research. On the other hand, the mean severity levels within groups were comparable to those of other studies of maltreated

children who were not necessarily in foster care (e.g., Bolger et al., 1998). Additionally, the preschoolers in this study might not be directly comparable to older children, who have had more time to experience more types of and more severe maltreatment. Older children are also likely to be able to report on their own histories of maltreatment; thus, profiles might look different in these age groups. This could be explored in future studies.

Due to the relatively small sample size, the contribution of gender to maltreatment classifications was not explored. Additionally, the small sample prevented exploration of the possible contributions of other dimensions of maltreatment. As is noted above, other researchers have found that dimensions such as frequency (Manly et al., 1994), chronicity (Bolger & Patterson, 2001), and developmental timing of maltreatment (Thornberry, Ireland, & Smith, 2001) contribute independently and in interactions (English et al., 2005) to child outcomes. Researchers might consider these aspects of maltreatment in addition to maltreatment severity and type in future research. One possible barrier to this might be multicollinearity between these different dimensions (Kinard, 2004). However, it would be useful to better understand how the various dimensions of maltreatment define different groups of children.

Researchers should extend findings to examine the specific mechanisms through which membership in each profile group is related to outcomes in future research. The association between profile membership and specific outcomes could be mediated through or moderated by factors such as gender, parental characteristics, and contextual factors. Exploration of these mechanisms will help refine the extant theories of maltreatment and intervention programs. Finally, the validity of the groups of maltreated children should be tested with independent samples. Given the relatively small sample size, the number of profiles identified in this study could have been limited.

Conclusions and Implications

Despite these limitations, the results of this study have a number of theoretical, practical, and policy implications. On a theoretical level, the study represents an important step in furthering knowledge about processes and mechanisms of maltreatment and its effects on child development. The findings suggest that it is possible to discern meaningful maltreatment profiles that differ in terms of both maltreatment type and severity. This underscores the co-occurrence of different types of maltreatment and the importance of considering multiple dimensions of maltreatment in research into this phenomenon and its sequelae. It also presents the possibility that the mechanisms by which maltreatment impacts children can vary across groups.

Additionally, there are a number of implications for the treatment of maltreated children. McCrae and colleagues (2006) noted in their study of profiles of sexually abused children that the severity rather than simply the presence of sexual abuse determined level of psychosocial difficulties. The results of the present study further corroborate their findings. As is noted above, it was not the presence of physical or sexual abuse that determined level of psychosocial and cognitive difficulties. Rather, the severity of such maltreatment, its co-occurrence with other maltreatment types, and the severity of those types predicted to differential outcomes. This suggests that, when recommending treatments and services for a child, practitioners and child welfare workers need to be cognizant of the child's maltreatment *profile* to tailor interventions to the needs of the child. Given the results of this study, this could include varying emphases on cognitive functioning, externalizing problems, and internalizing problems based on a child's profile. For example, treatment for the children in the sexual abuse/physical abuse/emotional maltreatment/neglect group might provide emphases on cognitive functioning, externalizing problems, and internalizing problems. For children with only either physical or sexual abuse in addition to neglect and emotional maltreatment, internalizing problems might

warrant special attention. For children who have experienced physical abuse as well as neglect, cognitive functioning also might be a treatment focus. Finally, for children who have primarily experienced supervisory neglect and emotional maltreatment, special attention might be paid to cognitive functioning. This is not to imply that all children in a given profile would need the same level of emphasis or would not need treatment and services for other psychosocial and cognitive problems. The groups differ in terms of relative levels of difficulties, not in the presence or absence of problems, and the choice of treatment should rely on adequate assessment, clinical judgment, and consideration of the child's characteristics and needs.

Overall this study demonstrates that is possible to quantitatively account for multiple types and dimensions of child maltreatment. This and future efforts to identify maltreatment profiles might aid in better understanding the mechanisms by which maltreatment affects adjustment, thus allowing for refinements in treatments and policy and better allocation of resources for these high-risk children and families.

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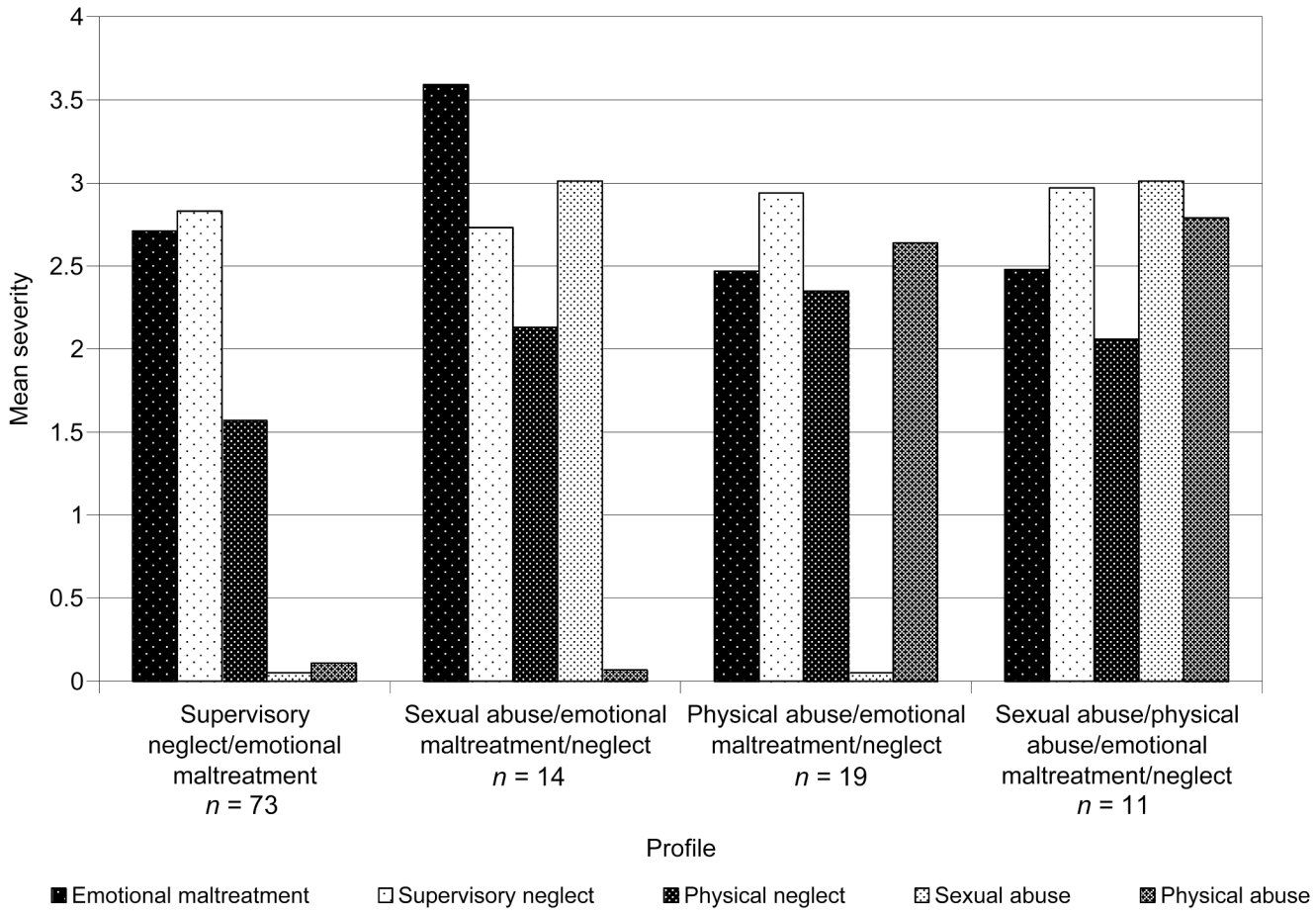

Figure 1.
Maltreatment profiles by type and severity.

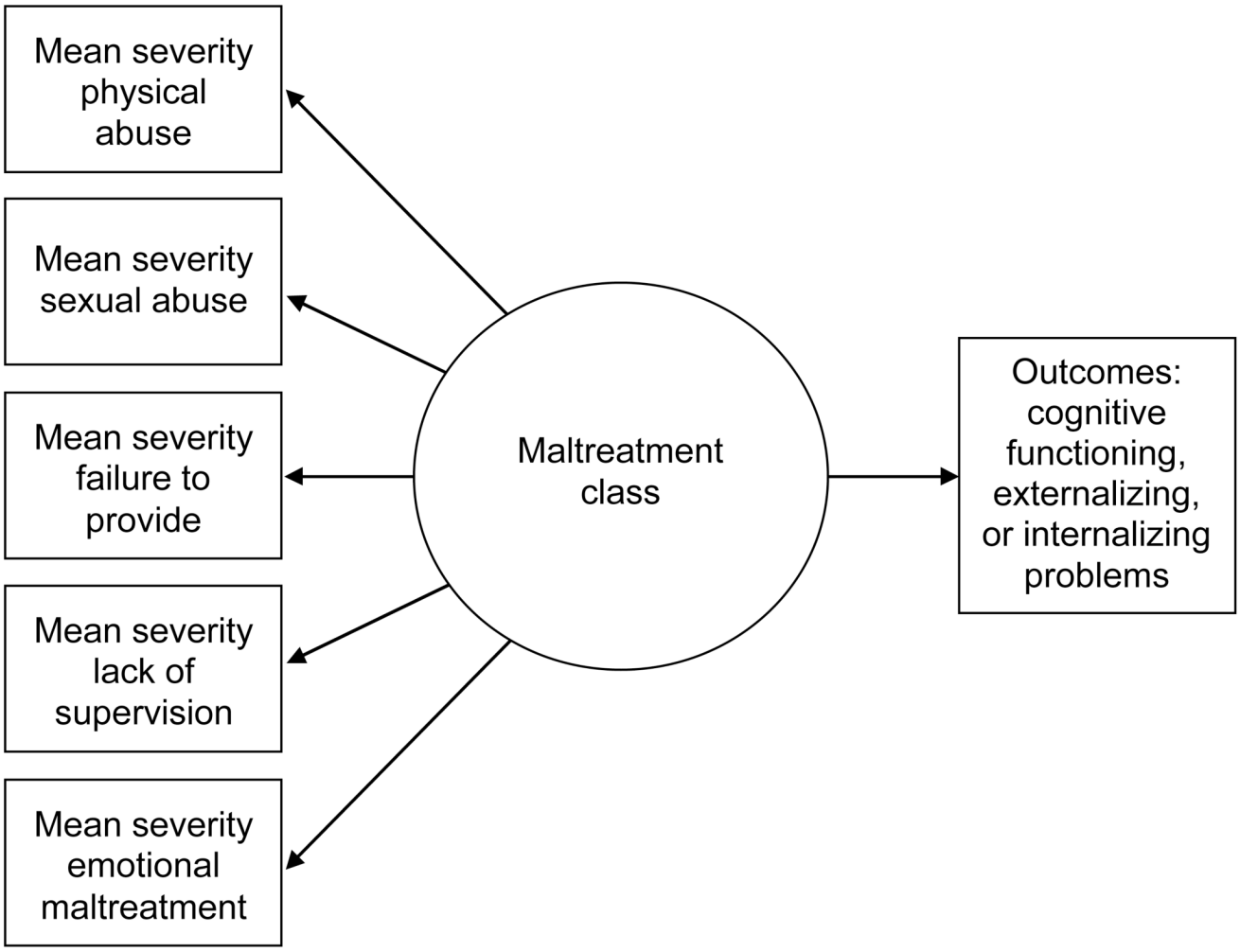

Figure 2.
LCA analyses.

Table 1

Composite Score Indicators

Composite score indicators	Overall composite score standardized alpha
Cognitive functioning	.89
Wechsler Preschool and Primary Scales of Intelligence-Revised: vocabulary and block design scales	
NEPSY: A Developmental Neuropsychological Assessment: visuospatial processing, memory and learning, sensorimotor function, and language core domain scores	
Preschool Language Scale-Third Edition: standardized total language score	
Externalizing problems	.89
Early Childhood Inventory: oppositional defiant disorder and conduct disorder scales	
Child Behavior Checklist: aggressive behaviors, delinquent behaviors, and social problems scales	
Emotion Regulation Checklist: lability/negativity subscale	
Internalizing problems	.76
Early Childhood Inventory: generalized anxiety, separation anxiety, PTSD and social phobia scales	
Child Behavior Checklist: anxious/withdrawn scale	

Table 2

Descriptives for the Maltreatment Variables

Maltreatment type	Incidence in sample		Severity including children with 0 severity		Severity excluding children with 0 severity		Range of severity excluding children with 0 severity
	%	#	*M*	*SD*	*M*	*SD*	
Physical abuse	33	38	0.76	1.23	2.35	0.96	1–4
Sexual abuse	26	30	0.69	1.28	2.68	1.01	1–4
Physical neglect	82	95	1.81	1.09	2.21	0.79	1–4
Supervisory neglect	89	104	2.85	1.23	3.21	0.75	1–5
Emotional maltreatment	90	105	2.76	1.34	3.08	1.01	1–5

Table 3

Fit Statistics for the LPA Models

Number of profiles	Bayesian information criteria	Log likelihood	*df*	Lo-Mendell-Rubin *p* value	Entropy
2	1844.27	−860.23	26	.001	1.00
3	1813.79	−830.70	32	.12	0.99
4	1793.82	−806.43	38	.06	0.99
5	1794.26	−792.36	44	.26	0.99

Table 4

Means and Standard Deviations for Outcomes by Group

	Supervisory neglect/emotional maltreatment group (*n* = 73)		Sexual abuse/emotional maltreatment/neglect group (*n* = 14)		Physical abuse/emotional maltreatment/neglect group (*n* = 19)		Sexual abuse/physical abuse/ emotional maltreatment/neglect group (*n* = 11)	
Outcome	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Cognitive functioning	−0.16	0.85	0.24	0.58	−0.35	0.94	−0.72	0.35
Externalizing problems	0.09	0.94	0.42	0.53	0.32	0.70	0.75	0.82
Internalizing problems	0.01	0.02	0.38	0.14	0.31	0.12	0.32	0.11