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Patterns of Maternal Childhood Maltreatment and Disrupted Interaction Between Mothers and Their Four-Month-Old Infants

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Abstract

Maternal childhood maltreatment (MCM) is associated with problematic parenting that may contribute to intergenerational transmission of negative health and social outcomes. Most prior work has used variable-centered approaches to assess MCM. Complementary person-centered approaches can identify groups of participants characterized by similar patterns of maltreatment. The current study assessed both types and patterns of MCM in relation to disrupted parenting among 179 mothers and their 4-month-olds. In variable-centered analyses, physical abuse was related to negative-intrusive maternal behavior and physical neglect to role-confused behavior. Person-centered analyses derived three classes of MCM, which differed in disrupted parenting. For example, mothers who experienced multiple types of maltreatment displayed more withdrawal than mothers in both other classes. Results document the differential effects of particular types and patterns of MCM on aspects of parenting and reveal that mother's history of maltreatment can affect the quality of mother-child interaction as early as four months of age.

Worldwide prevalence rates of child maltreatment range between 12% and 36% (Stoltenborgh et al., 2015). Childhood maltreatment often has profound and lifelong effects on physical, social, and emotional wellbeing (e.g., Hughes et al., 2017). These effects may be transmitted across generations as maltreated adults become parents. For example, a recent meta-analysis indicates that parents who experienced maltreatment in their own childhoods are more likely to maltreat their own offspring (Madigan et al., 2019). Children of parents with a history of childhood maltreatment are also at increased risk for emotional and behavioral problems (Plant et al., 2018). Therefore, there is a pressing need to understand the mechanisms contributing to the intergenerational effects of maltreatment.

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Features of Parenting Investigated in Relation Maternal Childhood Maltreatment

Research indicates that parents who maltreat their own children are more likely to show associated forms of disrupted parenting behavior (Wilson et al., 2008 meta-analysis). Studies have also investigated the parenting behaviors of parents who experienced maltreatment when *they* were children. Savage et al. (2019), in a recent meta-analysis, found that maternal childhood maltreatment (MCM) was associated with more negative, less positive, and poorer relationship-based parenting indices during the child's first six years of life. Savage et al. (2019) noted that most research on MCM and parenting has focused on only a few aspects of positive (e.g., sensitivity) and negative (e.g., intrusive) parenting behaviors, limiting our understanding of MCM effects on other aspects of parenting. In addition, two-thirds of the articles reviewed assessed the combined effect of all types of MCM on parenting. Given that different types of maltreatment (e.g., physical abuse versus physical neglect) may have different effects on parenting (e.g., harsh treatment versus disengagement), using aggregated measures of MCM prevents the examination of the effects of particular types of MCM on parenting.

When effects of particular types of MCM have been examined separately, specific effects have emerged. For example, Zvara et al. (2015) found that mothers with a history of childhood sexual abuse displayed lower levels of sensitive parenting, more harsh/intrusive parenting, and more boundary dissolution when interacting with their 5-year-old children, compared to mothers without such history. Bailey et al. (2012) reported that childhood emotional abuse, but not sexual or physical abuse, was associated with parental hostility towards their 4- to 6-year-old children. In contrast, other studies have found that sexual abuse and physical abuse were associated with hostile parenting only when they co-occurred (Pasalich et al., 2016). In addition, Lounds et al. (2006) found that childhood neglect was associated with lower levels of positive parent-child interaction. Importantly, however, given that maltreatment types often co-occur (Kim et al., 2017), assessing the specific effects of one form of MCM on parenting requires controlling for the effects of other types of MCM. In the above studies, only Bailey et al. (2012) controlled for all types of MCM when examining the impact of specific forms of MCM on parenting.

The above research used variable-centered regression analyses in assessing the parenting correlates of MCM. However, person-centered analytic approaches can provide complementary insights (Masyn, 2013). Variable-centered regression analyses can address the question of whether particular types of MCM are associated with particular parenting behaviors, controlling for the effect of other types of MCM. Person-centered analyses address two additional questions. First, what types of MCM reliably occur together? This is an important issue because the six frequently assessed types of MCM (physical, sexual, and emotional abuse; physical and emotional neglect; witnessing domestic violence) allow for numerous combinations, and it is likely that some combinations are more prevalent than others. Second, are the identified patterns of MCM differentially related to particular aspects of parenting?

Person-Centered Approaches to Identifying Patterns of Maltreatment

The high degree of heterogeneity in maltreatment experiences and the frequent co-occurrence of different types of maltreatment (Kim et al., 2017) speaks to the importance of using both variable-centered and person-centered approaches. A person-centered approach identifies patterns of maltreatment that occur across persons (Masyn, 2013). Latent Class Analysis (LCA; for dichotomous variables) and Latent Profile Analysis (LPA; for continuous variables) are well-suited for classification of individuals into mutually exclusive classes or profiles based on patterns of maltreatment that they share.

Indeed, studies have begun to use LCA and LPA to assess patterns of child maltreatment. For example, Hazen et al. (2009) used LPA to derive three profiles of maltreatment among youth, including a low maltreatment profile, an emotional and physical abuse profile, and a profile characterized by multiple types of maltreatment. Armour et al. (2014) found that child maltreatment patterns of young adults were best classified into four classes: a low maltreatment class, a psychological abuse class, a sexual abuse class, and a multiple maltreatment class. Together, these findings demonstrate that maltreatment types co-occur and that distinct classes of maltreatment can be identified, though the specific number of classes, as well as the types of maltreatment that typify each class, may differ across samples.

MCM and Parenting During the First Two Years of Life

Caring for a young infant requires different parenting responses than caring for a toddler, a school-aged child, or an adolescent. A recent review (Chamberlain et al., 2019) highlights the importance of assessing MCM during the first two years of life, as the transition to parenthood can be particularly stressful and may more readily elicit experiences of care received in one's own childhood. However, limited research assesses the association between MCM and parenting during this critical period. Pereira et al. (2012) found that maternal physical abuse and emotional neglect were associated with lower levels of maternal sensitivity at 17 months infant age, whereas emotional abuse, sexual abuse, or physical neglect were not linked to maternal sensitivity. However, Gonzalez et al. (2012) and Sexton et al. (2017) did not find significant associations between MCM and sensitive, hostile, controlling, or positive parenting behaviors.

Given the social and emotional challenges of the perinatal period (Chamberlin, 2019), several dimensions of disrupted parenting warrant particular attention in infancy, beyond the frequently studied dimensions of sensitivity, hostility, or intrusiveness. The Atypical Maternal Behavior Inventory for Assessment and Classification (AMBIANCE; Lyons-Ruth et al., 1999) was developed to assess five aspects of disrupted maternal interaction in infancy: affective communication errors, role-confusion, fearful-disorientation, negative -intrusive behavior, and withdrawal. Disrupted maternal interaction coded with the AMBIANCE has been shown to be associated meta-analytically with disorganized infant attachment (Madigan et al., 2006). Further, the mother's disrupted interaction in the first two years of life is associated with the severity of abuse experienced by her own child from birth to age 18 years (Khoury et al., 2020).

To date, two studies have assessed AMBIANCE ratings in relation to MCM. Nyström-Hansen et al. (2019), using a variable-centered approach, did not find an association between number of types of MCM and overall disrupted interaction, among mothers with severe psychiatric diagnoses and their 4-month-old infants. In contrast, Guyon-Harris et al. (2020), studying an impoverished urban sample at 12 months infant age, used a person-centered approach to identify patterns of MCM in relation to the five AMBIANCE ratings. That LPA identified four profiles of MCM: low maltreatment, high emotional and physical abuse, high sexual abuse, and exposure to multiple maltreatment types. The multiple maltreatment profile was related to both increased role-confusion and increased affective communication errors. Given that the few existing infancy studies are inconsistent as to whether MCM influences early parenting, work is needed to better understand the association between MCM and a wider range of parenting behaviors in early infancy, using both variable-centered and person-centered approaches.

Aims of Current Study

There were three overarching aims of the current study. The first aim was to assess whether *single types* of MCM were associated with specific forms of mother-infant interaction early in the first year of life. This aim was approached using variable-centered regression analyses, controlling for all other forms of maltreatment, in order to isolate the unique contribution of a particular form of maltreatment to later parenting. However, different types of maltreatment also frequently co-occur. Therefore, the second aim was to identify classes of mothers who had experienced similar patterns of maltreatment. This aim required the use of person-centered LCA, to evaluate how many patterns of MCM could be reliably identified among mothers in the sample. The third aim was to evaluate whether mothers in the identified classes exhibited specific forms of interaction with their infants. This aim was addressed by comparing the distal means of the mother's parenting behaviors across the LCA-derived classes.

Given relatively sparse literature on MCM in infancy, hypotheses were exploratory. In relation to Aim 1, we hypothesized that maternal history of physical abuse would be associated with increased negative intrusive behavior with the infant (e.g., Wilson et al., 2008), whereas maternal history of neglect would be associated with increased withdrawal from interaction (e.g. Lounds et al., 2006). In relation to Aim 2, we hypothesized that there would be three to four distinct classes of MCM (Armour et al., 2014; Guyon-Harris et al., 2020; Hazen et al., 2009), with one low/no maltreatment class (i.e., low probability of exposure to any form MCM), a second multiple maltreatment class (i.e., high probability of exposure to several types of MCM), and one or two additional classes characterized by high probability of specific types of maltreatment (e.g., high emotional abuse and physical abuse; high sexual abuse only). In relation to Aim 3, we expected that mothers in the multiple maltreatment class would display more aspects of disrupted maternal behaviour compared to those classified in the low/no maltreatment class. We also tentatively hypothesize that, if a high physical/emotional abuse class emerges, this class will be characterized by elevated negative intrusive behaviour. Given the novelty of this work, no further predictions were advanced.

Methods

Participants

Participants were 179 mothers and their 4-month-old infants enrolled in the Mother-Infant Neurobiological Development (MIND) study. Mothers were recruited through prenatal classes, community flyers, and local birth records. Recruitment was stratified for MCM history such that 53.1% of the mothers had experienced one or more forms of childhood maltreatment based on their responses to the Adverse Childhood Experiences (ACE) questionnaire (Felitti et al., 1998). Exclusion criteria were: a) English not a primary language, b) maternal age over 44 years at time of infant birth, c) infant born before 36 weeks gestation and/or weighing less than 2500g at birth, and d) infant had congenital developmental disorder or birth defect. Mothers ranged in age from 20 to 40 years (M = 32.15, SD = 4.17). Dyads were seen when the infants were approximately 4 months old (M = 4.72 months, SD = 0.99 months).

Measures

Maternal history of childhood maltreatment.—Mothers completed the 10-item Adverse Childhood Experiences (ACE) questionnaire (Felitti et al., 1998) during a phone call to assess participant eligibility based on study exclusion criteria and the stratification goal to yield a sample with approximately 50% experiencing MCM. On the ACE questionnaire, mothers reported their experiences of childhood maltreatment occurring before the age of 18, including presence of emotional, physical, and sexual abuse, emotional neglect, physical neglect, and domestic violence. Other forms of family dysfunction assessed on the ACE scale (i.e., parental separation/divorce, mental illness, substance abuse, and incarceration) were not used in the present report. Responses to the ACE questionnaire are recorded as dichotomous variables (0 = no, 1 = yes), indicating whether or not the participant endorsed a particular form of MCM. ACE scores predict a range of critical health and mental health outcomes, including psychiatric morbidity, cardiovascular problems, and mortality rates (Felitti et al., 1998; Merrick et al., 2017). Maternal ACEs specifically have been linked to postpartum maternal health, parenting behavior, and infant developmental outcomes (e.g., Racine et al., 2018). In addition, the ACE total score and subscale scores correlate highly with more detailed assessments of childhood maltreatment, including the Childhood Trauma Questionnaire (CTQ) and the Maltreatment and Abuse Chronology of Exposure Scale (MACE) (Schmidt et al., 2020; Teicher & Parigger, 2015).

Still-Face Paradigm (SFP).—At 4 months infant age, mothers and infants participated in a 10-minute video-recorded Still-Face Paradigm (SFP; Tronick et al., 1978) conducted in the home. During the SFP, the infant is seated and the mother is seated across from the infant at eye-level, facing the infant. The standard SFP consists of three episodes, each 2 minutes in duration. Here the SFP play period was extended by one minute and the reunion period by 3 minutes, to provide more time for behavioral observation. During the first episode, the mother interacted with her infant face-to-face for 3 minutes (play period). Next, the mother displayed a neutral face and did not interact with, touch, or vocalize to her infant for 2 minutes (still-face period). Finally, the mother reengaged in face-to-face interaction

for 5 minutes (reunion period). The SFP has been validated by meta-analysis as a mild to moderate infant stressor (Mesman et al., 2009).

Maternal disrupted interaction.—Maternal disrupted interaction with her infant during the reunion period of the SFP was rated by two trained coders using the Atypical Maternal Behavior Inventory for Assessment and Classification coding system (AMBIANCE; Lyons-Ruth et al., 1999). The reunion phase of the SFP was coded because it best captures the mother's ability to repair interaction with her infant after the stressor of the still-face episode. The AMBIANCE rates five aspects of disrupted interaction on 7-point scales, with higher scores indicating greater disrupted communication: 1. *Affective communication errors,* defined as incongruent affective signals to the infant or inappropriate or inadequate responses to the infant's cues (e.g., using a sweet tone of voice with a derogatory or demanding message); 2. *Role/boundary confusion*, defined as soliciting the infant's attention or affection to the self in ways that override or ignore the infant's signals (e.g., demanding attention or affection from the infant when the infant is distressed); 3. *Fearful /disoriented behavior*, defined as fearful, hesitant, deferential, or disoriented behavior toward the infant (e.g., frightened faces, frightened voices, tense body postures); 4. *Negative-intrusive behavior*, defined as harsh or critical verbal communication and/or physical behavior (e.g., mocking or teasing the infant; poking the infant; attributing negative motives to the infant); 5. *Withdrawing behavior,* defined as creating physical or emotional distance from the infant (e.g., leaning away from the infant; averting gaze; sitting silently). Interrater reliability between two coders on 30 randomly selected videos was strong on all scales: Affective communication errors ICC = .94, Role confusion ICC = .90, Negative-intrusive interaction ICC = .88, Fearful-disoriented interaction ICC = .93, Withdrawal ICC = .80. The AMBIANCE has demonstrated validity in relation to infant disorganized attachment, as well as strong stability over time (r = .56) (meta-analytic review, Madigan et al., 2006). While initially used with infants aged 12–18 months (Lyons-Ruth et al., 1999), AMBIANCE coding instructions also include considerations for coding younger infants. Prior studies have applied this coding in the SFP (Crockett et al., 2013; Khoury et al., 2020b; Nyström-Hansen et al., 2019).

Sociodemographic information.—Mothers reported their age, race, ethnicity, educational attainment, household annual income level, relationship status, and number of children. Race and ethnicity were combined to index minority status (Hispanic, Black, or multiracial).

Statistical Analyses

Preliminary descriptive and correlational analyses were conducted, using IBM SPSS Statistics, Version 25, to examine associations among MCM, the five aspects of maternal disrupted interaction, and potential covariates. Mplus Version 8 was used to conduct multivariate linear regressions and LCA. First, to evaluate whether there were unique effects of individual types of MCM on particular aspects of disrupted maternal interaction, all six MCM types were entered simultaneously into a multivariate regression analysis in relation to each aspect of disrupted interaction. Multivariate regressions were conducted using full information maximum likelihood (FIML) and bootstrapping with bias-corrected confidence

intervals (CIs)[1]. Significant effects are indicated by 95% CIs that do not contain zero ($p < 0.05$).

Second, LCA was conducted to empirically derive patterns of MCM based on the six dichotomous types of MCM. As recommended by Masyn (2013), log likelihood (LL) replication in conjunction with a number of absolute and relative fit indices were used to determine the optimal number of classes. A nonsignificant adjusted Likelihood Ratio (LR) Chi-square value implies adequate model-data consistency. The Akaike Information Criterion (AIC; Bozdogen, 1987), Bayesian Information Criteria (BIC), sample size adjusted BIC (aBIC; Sclove, 1987), Consistent Akaike's Information Criterion (CAIC), and Approximate Weight of Evidence Criterion (AWE; Banfield & Raftery, 993) were considered indicators of model fit, with lower scores on each statistic indicating better-fitting models. Elbow plots were used to explore diminishing gains for these fit indices (Masyn, 2013). In addition, the adjusted Lo-Mendell- Rubin Likelihood Ratio Test (aLMR; Lo et al., 2001), the bootstrap likelihood ratio test (BLRT; McLachlan & Peel, 2000), the Bayes Factor (BF; Wagenmakers, 2007), and the Approximate Correct Model Probability (cmP; Schwarz, 1987) were used to compare fit between two nested models (k, k-1). Significant *p*-values for aLMR and BLRT indicate that a model with *k*-1 classes should be rejected in favor of the model with *k* classes (Tein et al., 2013). BF > 10 is considered strong evidence for model k-1 (Wagenmakers, 2007). The model with the largest cmP value also indicates best fit. Lastly, entropy was used as an index of classification precision (entropy > .80 considered acceptable). With dichotomous indicators, the LCA yields probabilities that a given type of maltreatment will characterize a given pattern, with higher probabilities (>.70) indicating types central to the pattern (Nagin, 2005). Because the LCA is a probability-based analysis, classification rates will not map directly onto the reported rates of maltreatment.

Given prior theory and research that child maltreatment subtypes are intercorrelated, Tech10 Mplus output of the standardized residual covariances and the Bivariate Pearson chi-square values were examined, to test if the latent class solution adequately explained within-class intercorrelations between indicators. If residual covariances are significant, suggesting a violation of the assumption of local independence, specific within-class covariances will be added prior to subsequent analyses. After an unconditional class solution was derived, the manual maximum likelihood (ML) 3-step approach was used to simultaneously control for covariates and compare maternal behavior across the classes of MCM, while minimizing shifts in class composition (Nylund-Gibson et al., 2019). Model constraints were computed to create pairwise differences between the distal means of each type of maternal disrupted behavior across latent classes (Nylund-Gibson et al., 2019). Wald chi-square was used to test the differences between distal means.

The percent of missing values was 1.1% for the AMBIANCE (k = 2, due to video malfunction), 0.6% for the 'witnessing domestic violence' question on the ACE questionnaire (k = 1). Based on Little's Missing Completely at Random (MCAR) test, $\chi^2(16) = 16.04$, $p = .45$, these data were deemed to be missing at random and thus appropriate for the use of FIML.

[1]Results did not differ between bootstrapped and non-bootstrapped models.

Results

Descriptive Statistics and Preliminary Analyses

Descriptively, 43.5% (n =76) of the sample did not report any forms of maltreatment, 17.3% (n=31) reported experiencing one form of maltreatment, 15.1% (n=27) two forms of maltreatment, 13.4% (n=24) three forms of maltreatment, 5.0% (n=9) four forms of maltreatment, 3.4% (n=6) five forms of maltreatment, and 3.4% (n=6) all six forms of maltreatment. Regarding type of MCM, 39.7% (n=71) reported experiencing emotional abuse, 28.5% (n=51) reported physical abuse, 17.3% (n=31) reported sexual abuse, 28.5% (n=51) reported emotional neglect, 12.8% (n=23) reported physical neglect, and 18.0% (n=32) reported witnessing domestic violence. Means and standard deviations for the AMBIANCE scales were as follows: affective errors M = 3.86 (SD =1.72), role confusion M = 3.02 (SD= 1.48), fearful disorientation M = 3.10 (SD= 1.66), negative-intrusion M = 4.13 (SD = 1.50); withdrawal M = 2.14 (SD = 1.47). Skew and kurtosis statistics indicated that variables of interest did not violate assumptions of normality. Demographically, participants completed an average of 17 years of education and had a median annual income range of $76,000-$100,000; 90% of participants were living with a partner; 27% were minority (Black, Hispanic, or multiracial), with 73.6% White, 10.1% Black, 10.6% Hispanic, and 16.3% other backgrounds; 54% of infants were female, and 55.3% first-born. Associations among AMBIANCE scales, types of MCM, and sociodemographic variables are reported in Table 1. Minority status, education, income, and number of children were significantly associated with one or more AMBIANCE variables. Given the high correlation between income and education (r = .53, p < .01), regression and LCA analyses included minority status, income, and number of children as covariates.

Specific Types of Childhood Maltreatment and Disrupted Maternal Interaction

Unique effects of particular types of MCM on the five aspects of disrupted interaction were assessed in multivariate regression models. Covariates and all six types of MCM were entered simultaneously, so that effects of all other types of MCM were controlled. Physical abuse was uniquely associated with negative-intrusive interaction (β = 0.204, SE= 0.096, 95% CI [0.001, 0.384]). Physical neglect was uniquely associated with role confused interaction (β = 0.251, SE= 0.099, 95% CI [0.052, 0.439]). There were no other significant associations.

Latent Classes of Maternal Childhood Maltreatment and Disrupted Maternal Behavior

Fit indices of the LCA are reported in Table 2. The adjusted LR Chi-Square, AIC, and BIC indicated that the three-class solution was the most parsimonious and best fit model. Although the AIC and aBIC decreased slightly from the three- to four-class solution, inspection of elbow plots indicated that these minimal gains did not outweigh loss of parsimony. The CAIC and AWE suggested that a two-class model fit best (which was contrasted by LR Chi-Square values and comparative indices). In terms of comparative fit, the aLMR, BF and cmP all suggested a three-class solution fit best. Only the BLRT indicated a four-class solution was best. Entropy values were strong for models with three, four and five classes. It is common that all fit indices do not converge on a single model, due to differences in characteristics of fit indices (Masyn, 2013; Nylund-Gibson & Choi,

2018). However, the majority of the fit indices here pointed to a three-class solution as the best-fitting model.

The standardized residual covariances and the Bivariate Pearson chi-squares were examined to assess violations of the local independence assumption. None of the within-class standardized residual covariances were significant (z scores range |0.04| to |0.80|), and none of the Pearson Chi-Square values were significant (z scores range |0.01| to |1.00|). Therefore, within-class covariances were not added to the 3 class model.

The three-class solution consisted of a low maltreatment class, characterized by low probability of experiencing any form of MCM (N = 105, 59%); an emotional abuse class, characterized by a high probability of emotional abuse, often accompanied by physical abuse (N = 52, 29%); and a multiple maltreatment class, characterized by a high probability of experiencing multiple types of MCM (N = 22, 12%) (see Figure 1). As shown in Table 3, compared both to mothers in the low maltreatment class and to mothers in the emotional abuse class, mothers in the multiple maltreatment class displayed more withdrawal when interacting with their four-month-old infants ($p < .01$). Mothers in the multiple maltreatment class further differed from those in the emotional abuse class by displaying more role confusion ($p < .01$) and more fearful/disoriented behavior ($p < .05$). Lastly, mothers in the emotional abuse class displayed *less* role confusion compared to mothers in the low maltreatment class ($p < .01$).

Discussion

The current study underscores the associations between mothers' histories of childhood maltreatment and the quality of their interactions with their 4-month-old infants. The findings further indicate that the intergenerational effects of MCM appear very early in the parent-infant relationship. Finally, results revealed specific associations between types and patterns of MCM and particular aspects of disrupted maternal interaction, including negative-intrusion, role-confusion, fearful/disorientation, and withdrawal.

Related to the first aim of the study, two types of MCM were associated with specific parenting behaviors, regardless of the co-occurrence of other types of MCM. First, the mother's childhood physical abuse was associated with elevated negative-intrusive interaction with her infant, but not with other forms of interaction. Prior work ties a history of harsh care of the mother in childhood to harsh parenting of her own children (Pasalich et al., 2016). Importantly, however, prior studies typically have not controlled for the effects of other co-occurring forms of MCM. Given the frequent co-occurrence of maltreatment types (Kim et al., 2017), this finding extends the literature by demonstrating the specificity of the relation between a mother's history of childhood physical abuse and her own negative-intrusive behavior with her infant. Notably, this association is already evident in the first months of life.

Second, the mother's physical neglect was uniquely associated with maternal role/boundary confusion. Thus, experiences of physical neglect may contribute to the parent's seeking attention and affection from the infant in ways that are unresponsive to or override the

infant's cues. This finding adds to the literature on MCM because few studies have assessed specific forms of MCM in relation to role confusion and those studies have generally assessed specific forms of abuse, not neglect (Savage et al., 2019). In accord with our findings, Guyon-Harris et al. (2020) also found a bivariate association between maternal childhood physical neglect and role confusion in interaction with her infant at one year, although other types of maltreatment were not covaried. Thus, the current finding extends prior work by highlighting a unique effects of physical neglect in relation to maternal role confusion in early infancy.

In regard to the second aim of the study, three distinct patterns of maternal childhood maltreatment were identified by the LCA: 1) low probability of exposure to any type of MCM (59%); 2) high probability of emotional abuse (29%); and 3) high probability of exposure to multiple maltreatment types (12%). As noted in the introduction, prior mixture modelling approaches to identifying patterns of maltreatment exposure (in youth, young adults, and mothers) have generally identified either three or four classes. Previous studies have extracted a low maltreatment and a multiple maltreatment group, so there is strong consensus across studies regarding the occurrence of these patterns (Armour et al., 2014; Hazen et al., 2009; Guyon-Harris et al., 2020). In addition, a third class characterized by high emotional (psychological) abuse has also been identified across studies (Armour et al., 2014; Hazen et al., 2009), with one study also finding elevated physical abuse in this class (Hazen et al., 2009). Thus, the third pattern identified here also has good convergence with prior literature, since it was characterized most strongly by emotional abuse but also by a moderate probability of physical abuse (Figure 1). However, given our relatively small sample, this three-class solution must be replicated in larger samples to ensure generalizability.

In the studies that have identified a fourth pattern of maltreatment exposure, that pattern has been characterized by a high probability of sexual abuse, without elevated physical or emotional abuse (Armour et al., 2014; Guyon-Harris et al., 2020). Notably, in the present sample as well, the four-class solution derived a sexual abuse only class, but, as the fit statistics indicated, this class could not be discriminated with enough confidence in our sample, given the sample size. Thus, the results of the present LCA converge with the broader findings in the existing literature in identifying classes characterized by low maltreatment, by multiple types of maltreatment, and by emotional abuse, with some elevation in physical abuse as well.

Patterns of maltreatment are likely to vary somewhat across samples, given potential differences in socioeconomic status, minority status, and cultural background, all of which may contribute to different patterns of maltreatment (Lanier et al., 2014). Notably, in the only other person-centered study of MCM and parenting, Guyon-Harris et al. (2020) assessed an impoverished inner-city sample with lower SES than the current sample. The minority composition was also higher (60% compared to 27%). Given these differences, the similarity in the derived classes across studies is important and suggests the potential yield of future studies using mixture modelling in larger samples with more cultural and economic variation.

Most importantly, in relation to the third aim of the study, the three MCM classes were also associated with differences in aspects of disrupted maternal interaction. First, mothers in the multiple maltreatment class exhibited significantly higher levels of withdrawal when interacting with their infants, compared both to mothers in the high emotional abuse class and mothers in the low maltreatment class. In contrast, in the variable-centered analyses, withdrawal was not associated with any single type of MCM. This pattern of findings suggests that withdrawal occurs predominantly in the context of multiple forms of MCM, and thus should be considered a serious risk factor associated with the most severe maltreatment histories. Mothers who experience multiple types of maltreatment may tend to use limited engagement (e.g., low verbal communication or physical interaction), passivity, and withdrawal to deal with the multiple threats in their environments as children, and this may carry over into their early parenting. Maternal withdrawal is further linked to a host of adverse developmental outcomes for the child, including disorganized attachment in infancy (Madigan et al., 2006) and emotional lability and suicidality in adolescence (Lyons-Ruth et al., 2013). In addition, maternal withdrawal in infancy is the aspect of early parenting most strongly associated with the severity of maltreatment experienced by the child by age 18 (Khoury et al., 2020a).

In addition, mothers in the multiple maltreatment class, compared to mothers in the high emotional abuse class, displayed more fearful-disoriented and role-confused behavior in interaction with their infants. Fearful-disoriented behavior includes indicators of fear, confusion, and odd/out-of-context behavior in interaction with the infant. Attachment theory has long posited that fearful-disoriented behavior might indicate a continuing state of fear in the mother (e.g., Main & Hess, 1990). Experiencing multiple forms of child maltreatment may be intensely frightening and difficult to resolve, leading to continued manifestations of fear and disorientation in parenting behavior. Consistent with this theory, fearful-disoriented maternal behavior has been associated with other severe maternal risk factors, including prior maternal psychiatric hospitalization (e.g., Lyons-Ruth et al., 2009). Notably, fearful-disoriented interaction was significantly associated with exposure to domestic violence in the bivariate correlations, but was not found to have a unique relation to domestic violence with all other types of maltreatment controlled. This suggests that domestic violence may be one contributor to fearful-disorientation when it occurs in concert with other forms of maltreatment, as in the multiple maltreatment class. Further work is needed to identify the experiences associated with fearful disorientation.

Mothers exposed to multiple types of maltreatment also displayed more role-confusion compared to mothers in the high emotional abuse class. Role confusion is defined as the parent’s abdicating a parental role in relation to the child, including eliciting attention or affection from the infant in ways that interfere with the infant’s own directions. Given that mothers experiencing multiple types of maltreatment are less likely to have received nurturance in their own childhoods, this pattern of MCM might lead to a mother who is more needing of care, with limited ability to prioritize the infant’s needs over her own and a greater need to look to the infant for attention and affection. Guyon-Harris et al. (2020) also found that role confusion was higher in their multiple maltreatment profile compared to other profiles. In contrast to fearful-disorientation, role confusion was also significantly associated with physical neglect in our variable-centered analyses. Notably, physical neglect

was the least frequent type of MCM in this sample and occurred disproportionately in the context of multiple types of MCM (Figure 1). Thus, the elevated level of role confusion among mothers in the multiple maltreatment group may partly reflect the disproportionate occurrence of physical neglect in that group.

It is less clear why the emotional abuse class would show significantly *less* role confusion than the low maltreatment class. It may be that emotional abuse, without concomitant physical neglect, specifically works against the mother's looking to the infant for attention and affection. This possibility needs to be followed up in future work.

While the low maltreatment group had significantly lower levels of withdrawal than the multiple maltreatment group, as discussed above, the low maltreatment group did not differ from the multiple maltreatment group on other aspects of disrupted interaction, as might have been expected. The lack of additional differences may stem, in part, from how the LCA analysis works, in that mothers with other potential combinations of maltreatment types could not be reliably identified and assigned to separate classes with the present sample size. For example, there was some evidence that a fourth class, characterized by the occurrence of sexual abuse only, would improve fit (based on the BLRT index), but the preponderance of evidence did not allow the identification of a fourth class.in this sample. Thus, a number of mothers who were exposed to sexual abuse only remained classified in the low maltreatment class. The low maltreatment class also contained a number of mothers who had experienced one or two types of maltreatment that did not fit to a consistent pattern across participants. Specifically, of the 105 mothers categorized in the low maltreatment class, 74 experienced *no* types of maltreatment. Thus, this class included a sizeable but disparate group of mothers experiencing one or two forms of MCM, which likely contributed to the somewhat elevated levels of disrupted behavior in this group. In particular, it is notable that all classes in this sample, including the low maltreatment class, were characterized by relatively high levels of negative-intrusive behavior. Because negative- intrusive behavior was uniquely associated with physical abuse in childhood, this may have occurred because all classes included some mothers with physical abuse experiences, either alone or in combination with other forms of abuse. Larger samples may allow the differentiation of additional classes of mothers exposed to less frequent combinations of maltreatment.

Notably, our finding of increased withdrawal in the multiple maltreatment class differs from Guyon-Harris et al.'s (2020) finding of increased affective communication errors in that class. This may reflect the different ages of the two samples. Infants at four months can do little in the face of parental withdrawal, while by 12 months the infant can actively seek interaction and physical contact. Thus, mothers who might have withdrawn at four months will be forced to interact more by 12 months, and this increased interaction may lead to more affective communication errors. Studies across the first year of life are needed to assess this possibility.

Limitations and Future Directions

The results of this study should be interpreted in the context of study limitations. First, we used the ACE questionnaire, a brief self-report instrument, to index MCM. The ACE questionnaire has been criticized for its simplicity and limited coverage (McLennan et

al., 2020), including not providing information on developmental timing or perpetrators of maltreatment. However, the ACE questionnaire has shown strong criterion validity in relation to more comprehensive measures of maltreatment (e.g., Schmidt et al., 2020; Teicher & Parigger, 2015). In addition, the ACE questionnaire is known to have strong clinical construct validity, in that elevated ACE scores are associated with theoretically related mental and physical health outcomes (Felitti et al., 1998; Merrick et al., 2017). Finally, the loss of more detailed information is partly offset by the utility of the ACE questionnaire in public health and clinical settings where large numbers of individuals can be screened for risk secondary to childhood maltreatment. However, further studies of parenting behavior in relation to more detailed aspects of MCM, such as developmental timing and chronicity, are clearly needed. Second, this study only assessed maltreatment patterns and parenting behavior in mothers. Patterns of childhood maltreatment and their relations to parenting behavior might differ for fathers and this should be the focus of future work. Third, the mother-infant relationship is reciprocal, and we did not assess how the infant's emotions or behaviors might have contributed to difficulties in mother-infant interactions. Finally, the sample size, although similar to past research using LPA (Guyon-Harris et al., 2020), is relatively small for detecting class distinctions. In particular, 43.5% of the sample did not experience any form of maltreatment, which may have limited the ability to detect additional patterns of MCM. Related, other characteristics of the sample might limit the generalizability of our findings. Specifically, the sample was predominantly White and had a relatively high median income and education level. Thus, it is imperative for the present results to be replicated with larger and more diverse samples, including those with more severe histories of childhood maltreatment and more diverse sociodemographic characteristics. Replication is necessary to assess the generalizability of the present findings.

Conclusion

In summary, mothers' experiences of childhood maltreatment were found to be associated with the quality of the mother's interactions with her child in early infancy. Maternal experiences of childhood physical abuse and physical neglect were specifically related to negative intrusive behavior and on role confusion, respectively. In addition, experiencing multiple types of childhood maltreatment was related to increased withdrawal, role confusion, and fearful-disorientation in mother-infant interactions. These findings suggest that using both variable-centered and person-centered approaches may offer more sensitive assessments of how types and patterns of MCM are differentially associated with parenting behavior, as well as other aspects of the emerging mother-infant relationship. The ease of use of the ACE questionnaire also means that mothers' maltreatment histories can be relatively easily identified in public health settings during pregnancy. Early identification would allow mothers with multiple forms of MCM, in particular, to be prioritized for support services prior to the child's birth. Importantly, there are now a number of evidence-based treatments for mother-infant dyads that have demonstrated efficacy in improving early interactions and potentially minimizing these intergenerational effects of the mother's childhood maltreatment (e.g., Cicchetti et al., 2006).

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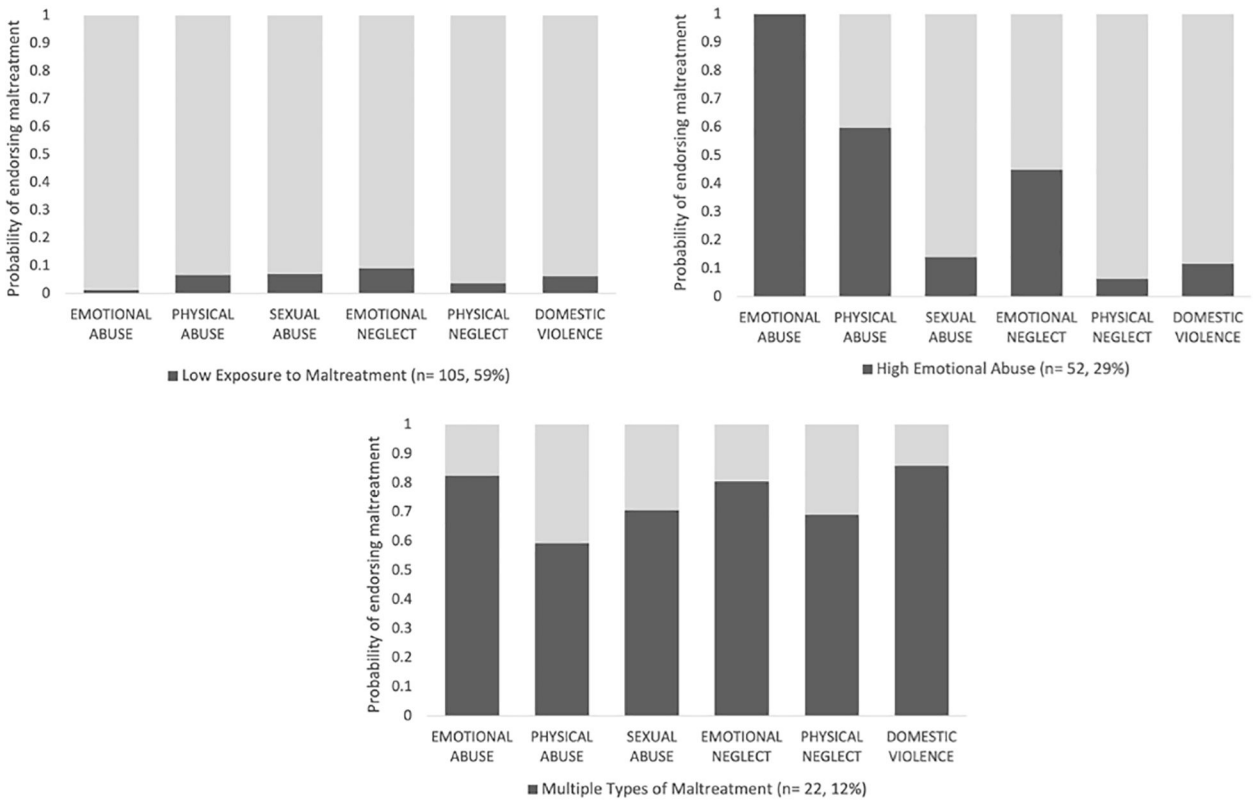

Figure 1.

Three patterns of maternal childhood maltreatment identified by latent class analysis

Note: Profiles of child maltreatment: (a) the low/no exposure to maltreatment class, (b) the high exposure to emotional abuse class, and (c) the exposure to multiple types of maltreatment class. These graphs are probability profiles, the y-axes indicate the probability (ranging from 0 to 1) that each type of maltreatment was endorsed by individuals in each class. Higher probabilities (>.70) indicate maltreatment types central to the class (Nagin, 2005).

Table 1.

Associations among potential covariates, aspects of disrupted maternal interaction, and types of maternal childhood maltreatment

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Single parent	---															
2. Minority status	.29**	---														
3. Education	−.34**	−.33**	---													
4. Income	−.43**	−.47**	.53**	---												
5. Number of children	.18*	.25**	−.28**	−.16*	---											
6. Child sex	−.13	−.05	−.02	.07	−.05	---										
7. Affect. comm. errors	.10	.28**	−.18*	−.20**	.10	−.07	---									
8. Role confusion	.18*	.20**	−.12	−.25**	.03	.00	.32**	---								
9. Fearful-disorient.	.20	.23**	−.12	−.24**	.07	.01	.58**	.41**	---							
10. Negative-intrusion	.09	.23**	−.20**	−.17*	.11	−.04	.61**	.51**	.41**	---						
11. Withdrawal	.07	.24**	−.10	−.15*	.09	−.02	.25**	−.18*	.29**	−.02	---					
12. Emotional abuse	.18*	.26**	−.18*	−.22**	−.04	−.04	.08	−.03	.05	.05	.09	---				
13. Physical abuse	.14	.20**	−.21**	−.21**	−.20	.01	.10	.06	.07	.18*	.08	.60**	---			
14. Sexual abuse	.16*	.22**	−.21**	−.25**	.13	.04	.02	.15	.12	.08	.04	.23**	.14	---		
15. Emotional neglect	.23**	.18*	−.26**	−.25**	.17*	.05	.06	−.01	.07	.07	.08	.45**	.29**	.33**	---	
16. Physical neglect	.23**	.20**	−.31**	−.29**	.21**	.11	.11	.26**	.19*	.15	.01	.27**	.20**	.31**	.35**	---
17. Domestic violence	.10	.32**	−.32**	−.29**	.21**	.02	.09	.15	.25**	.08	.09	.28**	.22**	.45**	.29**	.47**

Note. *M* = Mean; *SD* = Standard Deviation; Single parent: 1= single parent, 0 = married or in common-law relationship; Minority status: 1= Black, Hispanic or multiracial, 0= non-minority; Education = years of education; income = median range of annual income reported; Child sex: male=0, female=1; Affect. comm. errors = Affective communication errors; Fearful-disorient. = fearful-disorientation.

* $p < .05$.

** $p < .01$.

Pearson correlations are reported for associations between continuous variables; Point biserial correlations for associations between dichotomous and continuous variables; Phi correlations are reported for associations between dichotomous variables.

Table 2.

Fit indices of the latent class models of maternal childhood maltreatment

	Class size	Adj. X^2 (df), *p* value	AIC	BIC	aBIC	CAIC	AWE	Adj. LMR *p* value	BLRT *p* value	$BF_{K,K+1}$	cmP_K	Entropy
1-class	179	241.74(57), <.001	1150.27	1169.40	1150.40	1175.40	1218.52	n/a	n/a	0.000	0.000	n/a
2-class	114, 65	87.29 (49), <.001	1012.88	1054.32	1013.15	**1067.32**	**1160.76**	<.001	<.001	0.547	0.353	0.792
3-class	105, 52, 22	**49.85 (42), .189**	**989.37**	**1053.11**	**989.78**	1073.11	1216.86	**0.161**	<.001	**1406.487**	**0.646**	0.895
4-class	98, 53, 15, 13	31.02 (36), .704	981.55	1067.61	982.11	1094.61	1288.67	0.032	<.001	1299968.148	0.000	0.871
5-class	98, 47, 14, 13, 7	22.86 (29), .783	987.40	1095.77	988.09	1129.77	1374.14	0.112	**0.667**	n/a	0.000	0.903

Notes: Adj. X^2 = adjusted Likelihood Ratio Chi-square; AIC = Akaike Information Criterion; BIC = Bayesian Information Criteria; aBIC = adjusted BIC; CAIC= Consistent Akaike's Information Criterion; AWE = Approximate Weight of Evidence Criterion; aLMR = adjusted Lo-Mendell-Rubin Likelihood Ratio Test; BF = Bayes Factor coparing class k to class k+1; cmP = correct model probability.

Table 3.

Differences in maternal disrupted behavior across the three classes of maternal childhood maltreatment

	Class 1: Low Maltreatment		Class 2: High Emotional Abuse		Class 3: Multiple Maltreatment Types		Difference test (*p* value)		
Maternal disrupted communication	**M**	**SE**	**M**	**SE**	**M**	**SE**	**C1 v. C2**	**C1 v. C3**	**C2 v. C3**
Affective comm. errors	3.88	0.53	2.71	0.38	2.53	0.78	.91	.42	.43
Role confusion	3.68	0.50	2.84	0.45	4.32	0.57	<.01	.21	<.01
Fearful-disorientation	3.70	0.51	3.34	0.54	4.67	0.70	.22	.10	<.05
Negative-intrusion	4.13	0.42	3.89	0.47	4.63	0.54	.39	.29	.18
Withdrawal	1.46	0.30	1.34	0.36	3.66	0.50	.58	<.01	<.01

Note. Class 1: 59%, $n = 105$; Class 2: 29%, $n = 52$; Class 3: 12%, $n = 22$. Affective comm. errors = Affective communication errors.