

Emotion Expression, Emotionality, Depressive Symptoms, and Stress: Maternal Profiles Related to Child Outcomes

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Abstract This study investigated the relationships between various maternal characteristics and child outcomes in preschool age children. Participants included 128 mother-child pairs. Mothers and children participated in two observational tasks, clean-up and Tickle-Me-Elmo, which were coded for expressions of emotion, and mothers completed self-report surveys. A person-centered latent profile analysis was applied, identifying distinct maternal profiles defined by observed positive emotion expression and reported positive and negative emotionality, depressive symptoms, and parenting stress. Four profiles were identified, labeled Happy, Melancholic, Stressed, and Struggling. These profiles were found to be associated with child outcomes, including observed positive and negative emotion expression and problem behaviors. Specifically, the Melancholic and Struggling profiles tended to be negatively related to child emotion expression, while the Stressed and Struggling profiles tended to be related to greater child problem behaviors. The results highlight meaningful distinctions between concurrent, interacting maternal characteristics that contribute to child emotion socialization, and they suggest significant differentiations in the factors that contribute to child risk.

Keywords Emotion expression · Emotionality · Latent profile analysis · Maternal profiles · Child emotional development

The manner in which children learn to express and regulate their emotions is considered to occur within a social context, and the influence of parents in this process is especially significant (Eisenberg et al. 1998). Furthermore, the effective socialization of emotion in early childhood has been linked to many adjustment outcomes, including internalizing and externalizing behaviors (Denham et al. 2000). Of particular concern is the mother's role in socializing emotions, as she is commonly considered to be a key contributor to this process (e.g., Morris et al. 2007). While maternal socialization is very influential, mothers' traits and behaviors that may interact to differentially contribute to children's emotional development are generally considered independently and the interconnected nature of these influences is not fully understood. With the aim of better understanding the variability and complexities of the maternal role in the emotional development of children, the current study proposed to investigate differing maternal profiles in relation to child emotion expression and problem behaviors.

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Maternal Emotion Socialization: Influential Factors

Children develop adaptive emotion expression and regulation skills, in large part through the socialization they receive from their parents. Eisenberg, Losoya, and colleagues (2001) described emotion socialization as “parental practices and behaviors that influence a child's learning regarding the experience, expression, and regulation of emotion and emotion-related behavior” (p. 183). In a review of child emotion regulation development in the context of the family, Morris and

colleagues (2007) proposed a model in which parental influence occurs through the child's observation of the parent (e.g., parental modeling), parenting practices (e.g., parents' responses to emotions), and the emotional climate of the family (e.g., parental emotionality). The mother is especially significant in early childhood as children are beginning to develop and employ emotion regulation skills, but often still rely on external support. Applying Morris and colleagues' (2007) framework, we considered maternal characteristics that include or influence the emotions children would observe expressed by the mother, her emotion related parenting practices, and her influence on the emotional climate of the family.

Maternal Emotion Expression The emotional exchanges that take place between mother and child are especially significant in the emotion socialization process (e.g., Shaw et al. 2006). This involves the emotional modeling that children may observe and the direct emotional exchanges between mothers and young children. In particular, mutual positive emotion expression has been found to be an important component of healthy parent–child interactions and child adjustment (Chaplin et al. 2005). In their review, Morris and colleagues (2007) explained that maternal expression of positive emotions is linked to the child's emotion understanding and positive emotionality. Furthermore, it is suggested that through mother-child emotional interactions and exchanges, children develop emotion understanding and regulation abilities (Diamond and Aspinwall 2003).

Maternal Emotionality When considering the maternal influences on child emotional development, both expression and general maternal emotionality are of particular concern. Emotionality, one's reactivity to emotional stimuli, is understood as a temperamental trait that remains relatively stable across time and situations (Eisenberg et al. 2000). In general, positive maternal emotionality is associated with adaptive child outcomes; for example, the toddlers of mothers who report higher levels of family positive emotionality have been found to use more effective strategies to regulate emotions (Garner 1995). In contrast, negative emotionality within the family is generally associated with poorer child outcomes (Eisenberg et al. 2001b); however, this relationship is less consistent (Halberstadt and Eaton 2002). Because emotionality is considered to be a steady trait across contexts and time, a mother's emotionality would serve to contribute to and maintain the emotional climate for the family.

Maternal Depression In general, children of depressed mothers are at a greater risk to experience adverse outcomes, including poor social adjustment, academic difficulties, and internalizing and externalizing problems. Furthermore, exposure to mothers' negative or maladaptive emotion expression has been identified as one of the risk mechanisms that may

lead to these adverse outcomes (Goodman 2007). Depressed mothers are likely to have difficulties regulating their own emotions (Silk et al. 2006a) and experience greater challenges supporting their children's emotional development. Depressed mothers also tend to display more sad and irritable emotion (Cohn et al. 1990). Correspondingly, they tend to show less positive emotion to their children and are less likely to respond to children's distress than nondepressed mothers (Feng et al. 2008). Consequently, emotion expression and regulation in children of depressed mothers tends to be less effective compared to their peers (Silk et al. 2006b). Hence, maternal depression may influence a mother's parenting practices concerning emotion socialization, as well as the overall emotional climate of the family.

Maternal Stress Similar to depression, stress is related to emotion experience and expression (Zautra 2003). The association between stress and emotion also extends to mother-child interactions, as greater stress has been found to be related to lower maternal positive emotion expression and less dyadic pleasure expressed by mother and child, as well as increased rates of child behavior problems later (Crnic et al. 2005). Parenting stress also generalizes to other areas of child socialization and development, as higher rates of parenting stress are associated with both poorer parenting behavior and child outcomes (Feldman et al. 2004). More specifically, parenting stress is related to less nurturing parental behavior and greater levels of internalizing and externalizing behavior in children (Anthony et al. 2005). Here again, it can be seen that both parenting practices and the general emotional climate of the family are affected by maternal stress.

Defining Maternal Profiles

The research concerning maternal emotionality, emotion expression, depression, and stress, as they are related to child adaptive emotion expression and problem behaviors, presents a complicated picture. Maternal depression has been strongly implicated as adversely affecting child outcomes (e.g., Goodman 2007; Silk et al. 2006a). However, it is possible that various maternal characteristics interact to differentially influence the emotion socialization process. For instance, Weinberg and Tronick (1998) suggested that, though many depressed mothers tend to behave and express emotion similarly, when the literature is considered comprehensively, depressed mothers do not represent a homogeneous group. In interactions between depressed mothers and their infants, for instance, distinct patterns emerge characterized by intrusiveness or disengaged withdrawal, with a smaller group of these mothers having a good interaction style (Field et al. 2006).

Moreover, depressive symptoms make up a syndrome of possible behaviors and indicators that may manifest

differently across individuals and may be influenced by environmental factors. Typically, depression is characterized by high levels of negative emotion and low levels of positive emotion; however, depression symptoms can also include a lack of emotional response or flat affect (Clark and Watson 1991). The external factor of stress can additionally influence an individual's experience of emotion and exacerbate depressive symptoms (Monroe and Hadjiyannakis 2002). This suggests that emotion, depression, and stress are interrelated in complex ways that influence the expression of all of these individual factors.

We proposed to take a person-centered approach to the investigation of differing maternal profiles in relation to child emotion expression and problem behaviors. A person-centered approach, as opposed to variable-centered methods, addresses within-group variance by focusing on levels of co-occurring and inter-dependent characteristics within like individuals, and it allows for the organization of meaningful traits within an individual as they interact to influence outcomes (Henry et al. 2005; Von Eye and Bergman 2003). When applying a person-centered approach to the study of maternal emotionality and child outcomes, Nelson and colleagues (2012) identified three differing expressive styles characterized by (1) high levels of positivity and low levels of negativity, (2) very low positivity with average negativity, and (3) average positivity with very high negativity. Similarly, Brophy-Herb and colleagues (2013) identified four distinct maternal profiles as they related to toddler outcomes. These profiles were labeled Competent, Distressed, Expressive, and Controlled, varying significantly on maternal well-being and the family emotional climate. Collectively, these findings suggest that the influences that mothers have on their children's emotional development differ based on the combination of several possible maternal characteristics.

Maternal Profiles and Child Outcomes

In the current study, we investigated the maternal profiles in relation to child positive and negative emotion expression and behavior problems. Child emotion expression was considered within the context of positive and negative emotional stimuli and mother-child interactions, which can illuminate the process by which children learn to express and regulate their emotions. Additionally, disparities in the emotion socialization process have been shown to be related to child problem behaviors, including internalizing and externalizing symptoms. More specifically, high levels of maternal negative expression, stress, and depression, as well as low levels of maternal positive expression, tend to be related to greater child internalizing and externalizing problems (Anthony et al. 2005; Denham et al. 2000; Eisenberg et al. 2001a; Shaw et al. 1997; Silk et al. 2006a, b). Thus, it is not surprising that these

problem behaviors are characterized by emotion expression and emotion related behaviors (Achenbach and Rescorla 2001), and are consequently of interest in the current study. Differential associations of maternal influence across child internalizing and externalizing problems are often unclear amongst studies. Consequently, the current study was interested in examining components of these behaviors separately. Specifically, emotional reactivity, anxious/depressed symptoms, and withdrawal fall on the internalizing spectrum of behaviors, while aggressive behavior is a component of the externalizing spectrum of behaviors.

Recent efforts have been made to clarify the influence of interrelated maternal characteristics by identifying patterns of associations between maternal profiles and child outcomes, including children's emotion knowledge, emotion expression, emotion regulation, and problem behaviors. Nelson and colleagues (2012) found that profiles distinguished by maternal expressive style were related to both current child emotion expression (positive and negative) and emotion expression and emotion regulation one year later. Specifically, children of the high positive/low negative mothers exhibited less negative affectivity and better emotion regulation, while the children of the other two groups (one characterized by high negativity, the other low positivity) had poorer outcomes. Similarly, Brophy-Herb and colleagues (2013) found mothers' profiles to be differentially related to child behavioral outcomes, including internalizing and externalizing behaviors. They found that the most optimal profile, Competent, was associated with the most positive child outcomes (i.e., fewer problem behaviors, less dysregulation, and greater behavioral competence); whereas the Distressed profile, characterized by the most negative maternal features, was related to the poorest child outcomes (i.e., greater problem behaviors and dysregulation, as well as lower levels of behavioral competence). However, they also identified two other profiles characterized by both positive and negative features, Expressive and Controlled, which were differently related to certain child outcomes in comparison to the other groups. Specifically, both of these groups showed less dysregulation in comparison to the Distressed group, while children of the emotionally Controlled mothers showed fewer externalizing problems and greater behavioral competence in relation to this group. These findings suggest that diverse maternal characteristics can lead to both positive and negative child outcomes, and that no one feature is entirely sufficient when considering these influences and differing child outcomes.

The Current Study

We propose to investigate the relationships among various maternal behaviors and characteristics using a person-centered latent profile analysis, and to examine the

relationship between maternal profiles and child outcomes. Early preschool-age was selected, as it represents a time when children are still dependent on the parent for many of their needs, but are transitioning into school and gaining independence. Additionally, in order to gain a better understanding and further describe the mothers contained in each profile, the maternal profiles were investigated in relation to various demographic features.

Based on the previous research, we proposed three hypotheses. First, there would be three to four maternal profiles identified, with one defined primarily by high positive emotion (expression and emotionality) and low depressive symptoms and stress, another defined by high negative emotion, depressive symptoms, and stress, and a third or fourth defined by a mix of these characteristics. Second, maternal profiles characterized by high levels of positive expression and emotionality would be associated with greater child positive expressions, whereas maternal profiles characterized by high levels of negative expression, emotionality, stress, and depressive symptoms would be associated with greater child negative expressions, as compared to other profiles. Third, maternal profiles characterized by high levels of negative expression and emotionality, stress and depressive symptoms would be associated with greater child problem behaviors related to emotional development, as compared to the other profiles.

Methods

Participants

Data for this study were drawn from a larger, ongoing longitudinal project concerning maternal depression and child emotional development. The study was approved by the university institutional review board, and mothers consented for their own and their child's participation. Participants were recruited from the local community surrounding a large Midwestern city. Mothers with young children were recruited through local newspapers, online ads, as well as flyers sent to daycare centers, mental health clinics, and community centers. A brief, phone screening questionnaire was used to determine eligibility. Mothers met eligibility criteria if they 1) were 21 years of age or older; 2) had a biological child between 3 and 3.5 years; and 3) had not been diagnosed with psychiatric disorders other than depression (with or without co-occurring anxiety). Children were eligible for participation if they had not been diagnosed with a developmental delay, and only one child per family was eligible to participate in this study.

The current study included 128 mother-child pairs, with 63 male and 65 female children. On average, mothers were 31.21 (SD=5.58) and children were 3.23 (SD=0.19) years old. Approximately two-thirds (63.3 %) of this sample included mothers that identified their race as Caucasian only, while

the remaining mothers (36.7 %) identified themselves as having a minority or mixed race (African American 29.7 %, American Indian/Alaska Native 2.3 %, more than one race 4.7 %). About half of mothers in the sample had attained at least an undergraduate degree (51.6 %), with some of these mothers having graduate or professional degrees (22.7 %), while a small percentage had a high school education or less (13.3 %). Finally, a little over half (54.6 %) of the mothers had household incomes of less than \$50,000, with 21.1 % having incomes of less than \$20,000 and 11.7 % having incomes of \$100,000 or greater.

Procedures

The mother and child came into the research lab for a 2 hour visit. Mothers also completed several self-report questionnaires either in the one week period prior to coming to the lab visit or at the lab visit. The current study utilized data from two mother-child interaction tasks, clean-up and Tickle-Me-Elmo. In the clean-up task (5 min), mothers were instructed to ask their children to clean up some toys that they had been playing with together. Mothers were also instructed not to clean up the toys for the child. This task was utilized in order to elicit mild negative emotional reactions in the children. The second observed interaction task involved the mother and child playing together with a Tickle-Me-Elmo doll for 5 min. The Elmo doll would laugh and shake when he was "tickled" by the mother or child. This task was designed to elicit positive emotional reactions from the mother and child (Shaw et al. 2006). These interactions were video-recorded and coded for expression of emotion using a system adapted from several previous studies (Jabson et al. 2002; Silk 2004; Shaw et al. 2006). Coding was conducted by trained staff, and weekly meetings were held to discuss and reach consensus on instances of subtle or ambiguous emotion expression. Coders assessed either mothers or children exclusively in order to reduce bias.

Measures

Maternal Emotionality The Positive and Negative Affect Schedule (PANAS-X; Watson and Clark 1994) was included to assess mother's self-reported emotionality. This questionnaire contains 60 questions, and mothers indicated how much they felt a variety of feelings (e.g., interested, scared, nervous) on a 5-point scale from *very slightly/not at all* to *extremely*. Overall, these ratings assessed two factors of general positive and negative emotionality that were shown to be internally reliable (positive $\alpha=0.90$, negative $\alpha=0.92$).

Maternal Depressive Symptoms The Beck Depression Inventory-2nd Edition (BDI-II; Beck et al. 1996) was used to measure maternal depressive symptoms. The measure contains 21 questions rated on a 4-point scale that assess

symptoms associated with depression experienced over the last 2 weeks. An overall score of depressive symptoms was generated from these questions (range 0–63). This scale demonstrated high internal reliability ($\alpha=0.95$).

Maternal Stress The Parenting Daily Hassles questionnaire was used to evaluate stress associated with everyday events that parents encounter (PDH; Crnic and Greenberg 1990). The PDH contains 40 questions pertaining to 20 stressful events that mothers may experience. Twenty of the questions assessed the frequency with which mothers encountered these events and 20 questions assessed the intensity of how hassled the mother felt by them. The frequency and intensity subscales were shown to be reliable (frequency $\alpha=0.87$; intensity $\alpha=0.93$).

Maternal Demographic Factors Mothers also completed a questionnaire assessing demographic characteristics, including questions concerning maternal age (in years), the number of hours that the mother works per week, and the mothers' marital status (married, living with someone, separated/divorced/widowed, never married/single). Maternal race was also included and was categorized as White/Caucasian or minority/mixed race, as the majority of mothers either reported being White/Caucasian or Black/African American, with only a few reporting their race as American Indian/Alaskan Native or mixed race. Education was reported by the mothers in terms of grades in school completed or degrees earned and included: high school diploma/GED or less, associate's degree or some college, and college degree or higher. A variable for each family's incomes-to-needs ratio was calculated by dividing the household income by 100 % of the federal poverty line for the size of the household.

Mother and Child Observed Emotion Expression Mothers' and children's expressions of emotion were observed in two interactive tasks (clean-up and Tickle-Me-Elmo). Positive emotion was treated as one category, while different types of negative emotion expression were coded separately for anger/frustration, sadness, and fear (child only). Emotion expression in both mothers and children was recognized based on similar criteria. For each emotion, facial and vocal cues, as well as statements and gestures or movements, were considered. Positive emotion expression included: facial cues, such as smiling; vocal expressions and inflections (e.g., laughing, lilting/raised voice); statements, such as "this is fun"; and behaviors, such as clapping. Expressions of sadness included those that were facial (e.g., frowning, crying) and vocal (e.g., whining, dropping voice), as well as statements (e.g., "I don't like this") and behaviors (e.g., slumped shoulders, crossed arms). Examples of anger/frustration expression included: facial cues (e.g., drawn brows, tight lips); vocal cues (e.g., yelling, harsh tone); statements (e.g., "No!", "Do it now!"); and behaviors (e.g.,

throwing toys). Finally, instances of fear in children included those that were facial (e.g., wide-eyes) and vocal (e.g., whimpering), as well as statements (e.g., "Get it away") and behaviors (e.g., pulling away quickly).

This coding method resulted in mother and child variables representing overall duration of time each emotion was expressed. The final scores for each emotion expression variable represented percent of time the emotion was expressed, derived by dividing the duration of emotion expression by the total duration of the task that could be coded and multiplying the ratio by 100. For both observational tasks, 35 % of the observations were double-coded to assess inter-coder reliability. The child codes included positive emotion (clean-up kappa=0.79; Elmo kappa=0.78), anger/frustration (clean-up kappa=0.75; Elmo kappa=0.74), sadness (clean-up kappa=0.78; Elmo kappa=0.64), fear (clean-up kappa=0.80; Elmo kappa=0.70), and mother included positive emotion (clean-up kappa=0.77; Elmo kappa=0.72). Maternal expressions of negative emotions were very rare and brief; only 18.7 % of mothers expressed any type of negative emotions during either clean-up or Elmo. Thus, maternal negative emotion expressions were not included in the final analysis. Additionally, individual types of child negative emotion (anger, sadness, fear) also occurred infrequently and thus were combined within each task and converted into dichotomous variables representing the presence or absence of negative emotion.

Child Internalizing and Externalizing Symptoms Mothers completed the Child Behavior Checklist (ages 1 ½ to 5) in order to assess child problem behaviors that are commonly associated with emotion expression and development (CBCL; Achenbach and Rescorla 2001). Mothers were asked to rate their children on a variety of behaviors on a 3-point scale (0=not true; 1=somewhat or sometimes true; 2=very true or often true). The CBCL contains subscales that were calculated for child Emotional Reactivity, Anxious/Depressed Symptoms, Withdrawal, and Aggressive Behavior. These subscales were each shown to be internally reliable (Emotional Reactivity $\alpha=0.67$; Anxious/Depressed Symptoms $\alpha=0.74$; Withdrawal $\alpha=0.61$; and Aggressive Behavior $\alpha=0.88$).

Statistical Analyses

Latent profile analysis (LPA) was utilized in order to categorize mothers based on their observed and self-reported responses across seven indicator variables associated with emotion, depression, and stress. This person-centered analytic approach produces classes in which indicators are locally independent. The aim of LPA is to identify the smallest number of classes that best describe the associations between the indicator variables (Muthén 2001). This method utilizes the indicator variables to estimate class probabilities for each individual, and the number of classes is determined through the

comparison of fit statistics. Thus, in the current study individual differences between mothers on emotion expression, emotionality, depressive symptoms, and stress would be explained by the presence of underlying classifications with similar patterns of behavior.

Mplus 7.3 (Muthén and Muthén 2014) was used to conduct the LPA analyses. With LPA there are several statistics of model fit, while relevant theory and substantive interpretation of classes are ultimately considered. Starting with a single class solution, additional classes are added in order to compare and select an optimal class number as indicated by the selection criteria. In the current study, the Bayesian Information Criterion (BIC) and the sample-size adjusted Bayesian Information Criterion (ABIC) were used to indicate relative fit of each model with a different number of classes. BIC and ABIC have been shown to be reliable indicators of model fit, while a bootstrapped likelihood ratio-test (BLRT) shows consistency when assessing the fit between two nested models with different number of classes (Nylund et al. 2007). When applying the BLRT, a significant p value indicates that a model with k classes has better fit than a model with $k-1$ classes. Additionally, while entropy is not used as a criterion for selecting class number, it is used as a measure of classification certainty, or how distinctly each individual fits within their class. Entropy values closer to 1 indicate better classification.

The maternal profiles were then compared on various demographic factors, including maternal age, race, education, marital status, and hours worked per week, as well as family income-to-needs ratio. This allowed for the investigation of fundamental differences across the groups. For this analysis, the conditional probabilities were used to assign profile membership. An ANOVA was conducted for the continuous demographic variables (age, hours worked per week, income-to-needs ratio), while a chi-square was conducted for the categorical variables (race, marital status, education), comparing profile groups.

The identified maternal profiles were also evaluated in association with child outcomes. Thus, we were interested in using the latent categorical variable produced from the LPA to explore the relationship between the profiles and other auxiliary observed variables, or distal outcomes. This allowed for the consideration of the latent maternal profiles in relation to child behaviors related to emotion expression. In order to incorporate the uncertainty in profile membership included in the LPA, we employed two model-based approaches. When predicting the continuous outcome variables (observed positive emotion and child behavior problems) from the latent class memberships, we employed the 3-step model-based approach outlined by Asparouhov and Muthén (2014). This method estimates the latent class model using the indicator variables in the first step of

analysis, and then creates the most likely class variable using the latent class posterior distribution in the second step. Finally the most likely class is used to predict the distal outcomes in the third step, while accounting for the measurement error in the most likely class membership from the second step. For the dichotomous outcome variable (observed negative emotion), we used the model-based approach described by Lanza et al. (2013). This approach is somewhat similar to the 3-step method and can be used with categorical outcomes. Thus, both of these methods directly model the association between latent classes and distal outcomes, while reducing bias by incorporating the degree of uncertainty of class membership included in the LPA analysis.

Results

Preliminary Analyses

Descriptive statistics of the study variables are presented in Table 1. The maternal variables included in the LPA were evaluated for their distribution. Mother positive emotion expressed during the clean-up task was found to be highly positively skewed (skewness=3.37, standard error=0.22) so this variable was transformed using its natural log before being entered into the analysis. Two cases included some missing data; however, Little's test revealed that the data were missing completely at random, $\chi^2(5, N=128)=3.01, p=0.70$. Thus, full information maximum likelihood estimation was used in the analyses.

Maternal Profile Latent Class Analysis

The first goal of this study was to conduct an LPA in order to determine maternal profiles based on differing levels of shared characteristics. The seven indicators included maternal positive emotion expression observed during the two interactions tasks (clean-up and Elmo), positive and negative emotionality (self-reported), depressive symptoms, and stress (frequency of stressful events and intensity experienced). LPA fit indices for the latent class solutions are summarized in Table 2. The four-class solution yielded the lowest BIC; however, the ABIC was lower for the five-class solution. In order to identify the best fit between the four and five-class solutions the BLRT and entropy were examined. The BLRT indicated that the five-class solution did not show significantly better fit than the four-class solution. Additionally, entropy also supported the four-class solution over the five. Thus, the four-class solution was selected based on the BIC and ABIC indicating a better fit than the three-class solution and the BLRT and entropy indicating a better fit than the five-class solution, while theoretical considerations also supported the four-class solution.

Table 1 Descriptive statistics for maternal profile and child outcome variables

	N	%	M	SD	Range
Mother positive expression: Clean-up	127		13.27	9.68	0.00–39.80
Mother positive expression: Elmo	127		25.90	18.61	0.00–77.72
Maternal positive emotionality	128		24.29	8.20	10.00–45.00
Maternal negative emotionality	128		16.34	7.28	10.00–44.00
Parenting stress: Frequency	128		23.66	9.51	7.00–51.00
Parenting stress: Intensity	128		22.67	14.68	0.00–63.00
Maternal depressive symptoms	128		15.44	12.81	0.00–54.00
Child positive expression: Clean-up	127		1.80	2.56	0.00–11.20
Child positive expression: Elmo	127		21.91	16.48	0.00–71.66
Child negative expression: Clean-up	127				
No expression		60.2			
Some expression		39.1			
Child negative expression: Elmo	127				
No expression		46.9			
Some expression		52.3			
Child emotional reactivity	126		2.05	2.01	0.00–10.00
Child anxious/depressed symptoms	126		1.83	2.14	0.00–10.00
Child withdrawal	126		1.14	1.59	0.00–10.00
Child aggressive behavior	126		9.17	6.32	0.00–30.00

Figure 1 summarizes the prevalence and characteristics of the identified four classes. Labels were assigned to classes based on their overall pattern across the seven indicator variables. The largest class ($n=67$, 52.3 %) was labeled Happy as it was characterized by features associated with positive emotion and the most optimal functioning. The mothers had average-to-high observed positive emotion expression with high positive emotionality, while having low negative emotionality, stress and depressive symptoms. The second class ($n=28$, 21.4 %) was labeled Melancholic as these mothers were low on the positive emotional measures and had high depressive symptoms. They had low-to-average observed positive emotion expression, low positive emotionality, average stress, as well as high negative emotionality and depressive symptoms. The third class ($n=16$, 12.5 %) was labeled Stressed as these mothers were distinguished by high levels of stress. They had low-to-average positive emotion

expression, low negative emotionality, high positive emotionality as well as stress, and elevated depressive symptoms. Finally, the fourth class consisted of 13.8 % of the sample ($n=17$) and was labeled Struggling because the mothers mostly shared features associated with poor functioning. This class had high positive observed emotion expression; however, the mothers reported low positive emotionality and high negative emotionality, stress and depressive symptoms.

Demographic Features of Maternal Profiles

The maternal profiles were also compared based on various maternal demographic features in order to understand these groupings in light of possible contributing contextual factors. These included maternal age, education, race, number of hours worked per week, marital status, and family income-to-needs ratio. For each of the continuous variables, an ANOVA was conducted using profile membership as the grouping factor (Table 3). These analyses revealed significant differences among the profiles on income-to-needs ratio, $F(3, 124)=3.32$, $p=0.02$, partial $\eta^2=0.07$, and hours worked per week, $F(3, 122)=2.83$, $p=0.04$, partial $\eta^2=0.07$. Chi-square tests were conducted with the categorical demographic variables, but no significant relationships were found (Table 3).

Table 2 Fit indices for latent profile analysis models

Model	BIC	Adjusted BIC	BLRT	Entropy
1-class	6780.12	6736.44	–	–
2-class	6597.03	6527.45	–3356.39***	0.89
3-class	6588.45	6493.57	–3245.14***	0.91
4-class	6581.73	6461.55	–3221.54***	0.88
5-class	6594.11	6448.63	–3198.65	0.85

Bold indicates best fit

BIC Bayesian Information Criterion, BLRT bootstrapped likelihood ratio-test

*** $p<0.001$

Child Outcome Analyses

We then analyzed the maternal profiles in relation to child outcomes. Child positive emotion expression, negative emotion

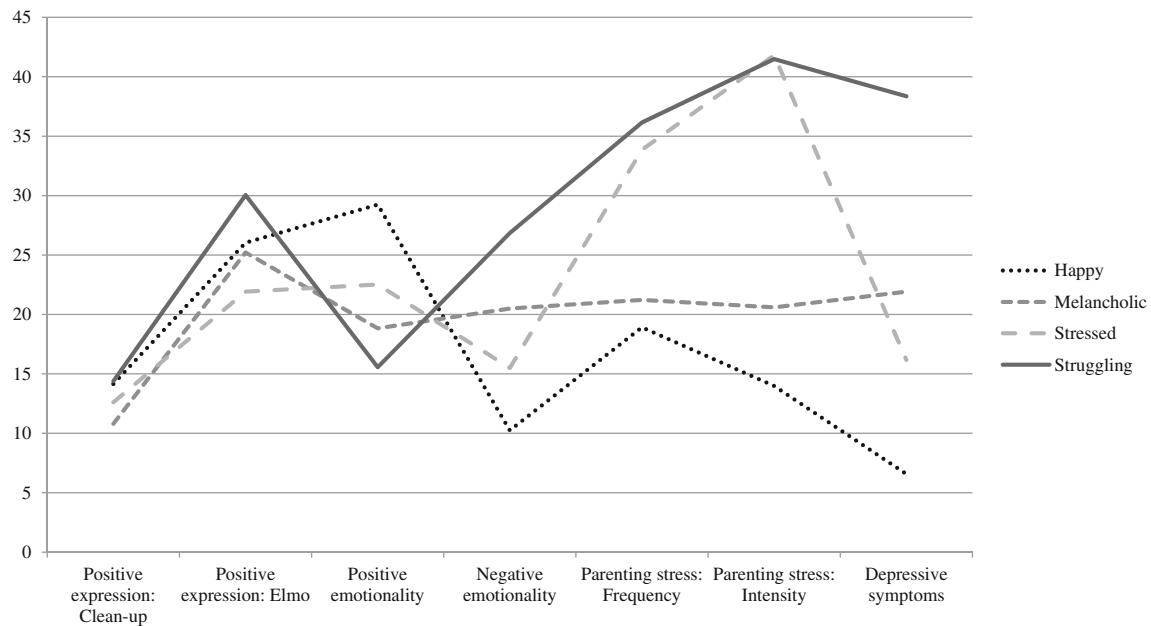


Fig. 1 Means of the defining characteristics for each identified profile

expression, and problem behaviors were considered in separate analyses. Model-based approaches were utilized that incorporated the LPA in order to account for uncertainty in profile membership. Within each model, pairwise comparisons between groups were reported. For the sake of clarity and consistency, all groups were first compared to the Happy profile, as this was the largest group of mothers representing the most optimal maternal characteristics. Subsequently, additional pairwise comparisons were made among the other three profiles.

Results revealed significant differences among the profiles for child observed positive emotion during the clean-up task,

but not the Elmo task (Table 4). During the clean-up task, the children of the Melancholic, $\chi^2(1)=9.04, p=0.003$, and Struggling, $\chi^2(1)=4.32, p=0.038$, mothers displayed less positive emotion than those of the Happy mothers, whereas children of the Stressed and Happy groups did not differ. Additionally, children of the Melancholic, $\chi^2(1)=8.13, p=0.004$, and Struggling, $\chi^2(1)=6.33, p=0.012$, mothers also showed less positive emotion than those of the Stressed group. Finally, the Melancholic and Struggling groups did not differ on children's positive expression. Profile groups were also compared on levels of child negative emotion expression (Table 5).

Table 3 Descriptive statistics and group differences on demographic characteristics of the maternal profiles

	Happy	Melancholic	Stressed	Struggling	F/ χ^2
Maternal age	31.04 (5.17)	31.89 (5.87)	31.75 (5.83)	30.24 (6.67)	0.38
Hours worked per week	27.80 _a (19.39)	25.11 _{a,b} (21.87)	17.67 _{a,b} (16.13)	14.00 _b (19.81)	2.83*
Income-to-needs ratio	2.87 _a (1.96)	2.12 _{a,b} (1.67)	1.49 _b (1.27)	2.01 _{a,b} (1.81)	3.32*
Race (<i>df</i> =3)					1.02
Minority (%)	40.3	32.1	37.5	29.4	
Caucasian (%)	59.7	67.9	62.5	70.6	
Marital status (<i>df</i> =9)					7.39
Married (%)	64.2	50.0	43.8	58.8	
Living with someone (%)	9.0	17.9	18.8	23.5	
Separated/Divorced/Widowed (%)	9.0	17.9	18.8	11.8	
Single/Never married (%)	17.9	14.3	18.8	5.9	
Education (<i>df</i> =6)					8.02
High school or less (%)	9.0	17.9	6.3	29.4	
Associate's degree or some college (%)	32.8	35.7	37.5	41.2	
College degree or higher (%)	58.2	46.4	56.3	29.4	

* $p < 0.05$. Differing subscripts within rows indicate significantly different means at $p < 0.05$

Table 4 Maternal profile comparisons for child positive emotion expression

	Happy		Melancholic		Stressed		Struggling		df	χ^2
	M	SE	M	SE	M	SE	M	SE		
Positive expression: Clean-up	2.08 _a	0.42	.50 _b	0.29	3.97 _a	1.16	.83 _b	0.43	3	20.09***
Positive expression: Elmo	22.26	2.27	20.96	3.78	18.69	2.96	25.04	4.28	3	1.68

*** $p < 0.001$. Differing subscripts within rows indicate significantly different means at $p < 0.05$

Significant differences were found between the profiles only for the Elmo task, and not for the clean-up task. During the Elmo task, the children of the Struggling mothers showed higher levels of negative emotion than those of the Happy, $\chi^2(1) = 19.94, p < 0.001$, as well as the Melancholic, $\chi^2(1) = 5.07, p = 0.024$, and Stressed $\chi^2(1) = 7.93, p = 0.005$, mothers. No differences were found among the Happy, Stressed, and Melancholic groups.

The maternal profiles were additionally considered in relation to child problem behaviors related to emotional development, including emotional reactivity, anxious/depressed symptoms, withdrawal, and aggressive behavior (Table 6), and these results revealed that the children whose mothers belonged to the different profiles varied significantly in their levels of each of the behaviors. Children of the Stressed, $\chi^2(1) = 10.73, p = 0.001$, and Struggling, $\chi^2(1) = 9.57, p = 0.002$, mothers were more emotionally reactive than those of the Happy group; children of the Stressed, $\chi^2(1) = 6.87, p = 0.009$, and Struggling, $\chi^2(1) = 5.21, p = 0.022$, mothers were also more emotionally reactive than those of the Melancholic group. No difference were found between the Melancholic and Happy groups or between the Stressed and Struggling groups.

Children of the Stressed, $\chi^2(1) = 4.92, p = 0.027$, and Struggling, $\chi^2(1) = 7.43, p = 0.006$, mothers showed more anxious/depressed symptoms than those of the Happy group, while the Melancholic and Happy groups did not differ and the Melancholic, Stressed, and Struggling groups did not differ. The children of the Struggling mothers, $\chi^2(1) = 7.66, p = 0.006$, had higher levels of withdrawal than those of the Happy

group, though the Happy group did not differ from the Melancholic or Stressed groups. Furthermore, the children of the Melancholic mothers had lower levels of withdrawal than those of the Stressed, $\chi^2(1) = 7.07, p = 0.008$, or Struggling, $\chi^2(1) = 9.65, p = 0.002$, groups, while the Stressed and Struggling groups did not differ from each other. Finally, children of the Stressed, $\chi^2(1) = 5.78, p = 0.016$, or Struggling, $\chi^2(1) = 8.94, p = 0.003$, mothers had higher levels of aggressive behavior than those of the Happy group. The Happy and Melancholic groups did not differ on this behavior, and the Melancholic, Stressed and Struggling profiles also did not differ amongst groups.

Discussion

The first goal of this study was to identify distinct maternal profiles described by characteristics associated with mothers’ emotional experiences. Four maternal groupings were found, Happy, Melancholic, Stressed, and Struggling. As hypothesized, the Happy group was characterized by positive emotion expression/emotionality and low depressive symptoms and stress, while the Struggling group was primarily characterized by high negative emotionality, depressive symptoms, and stress. Also, as anticipated, the Stressed and Melancholic groups were characterized by a mix of positive and negative emotion related characteristics.

Amongst the four identified maternal profiles, the Happy mothers were characterized by shared features commonly associated with the lowest risk and most optimal functioning. This included high levels of both observed and self-reported positive emotion expression and emotionality, as well as low levels of negative emotionality, stress, and depressive symptoms. Higher levels and more common displays of positive maternal emotion are generally associated with more adaptive child emotion regulation (Diamond and Aspinwall 2003; Garner 1995), while lower negativity and depressive symptoms are associated with fewer child problem behaviors (Leckman-Westin et al. 2009). In contrast, the mothers classified as Struggling tended to share many characteristics related to unsupportive parenting (e.g., low levels of positive emotionality and high negative emotionality, depressive symptoms and stress) and poorer child outcomes. Together, the Happy

Table 5 Maternal profile comparisons for child negative emotion expression

	OR	SE	χ^2
Negative expression: clean-up			3.16
Stressed	0.42	0.42	
Melancholic	0.89	0.493	
Struggling	2.09	1.28	
Negative expression: Elmo			22.59***
Stressed	0.92	0.58	
Melancholic	1.33	0.86	
Struggling	9.30	7.17	

*** $p < 0.001$. Happy group is used as reference

Table 6 Maternal profile comparisons for child problem behavior outcomes

	Happy		Melancholic		Stressed		Struggling		df	χ^2
	M	SE	M	SE	M	SE	M	SE		
Emotional Reactivity	1.29 _a	0.17	1.78 _a	0.23	3.96 _b	0.79	3.34 _b	0.64	3	21.85***
Anxious/ Depressed	.99 _a	0.30	2.14 _{a,b}	0.51	3.15 _b	0.93	3.21 _b	0.76	3	13.09**
Withdrawn	.80 _{a,b}	0.17	.59 _a	0.12	1.70 _{b,c}	0.41	2.69 _c	0.67	3	17.68***
Aggressive Behavior	7.24 _a	0.62	9.14 _{a,b}	1.39	13.08 _b	2.35	12.82 _b	1.76	3	14.81**

** $p < 0.01$, *** $p < 0.001$. Differing subscripts within rows indicate significantly different means at $p < 0.05$

and Struggling mothers tended to represent two contrasting profiles (high positive/low negative vs. low positive/high negative) that have been typically accepted when using a variable-centered approach and have generally been associated with adaptive and poor child outcomes, respectively. However, two additional maternal profiles were identified which were not characterized by such clear-cut beneficial and risky maternal characteristics.

Both the Melancholic and the Stressed profiles had elevated depressive symptoms; however, they were distinguished by emotionality and stress, which may suggest different etiological pathways for their elevated depressive symptoms. The Melancholic mothers shared the tendency for low positive and high negative emotionality, characteristic of the stable emotional features of depression (Clark and Watson 1991), while the Stressed mothers shared high stress levels, characteristic of contextual factors which may exacerbate depressive symptoms (Monroe and Hadjiyannakis 2002). Supporting this, the Stressed mothers were more likely to rate stressful events as more intensely stressful than Melancholic mothers; additionally, the Stressed mothers had the lowest income-to-needs ratio, suggesting fewer resources which may contribute to parenting stress. Overall, the varying characteristics of the Melancholic, Stressed, and Struggling profiles, which shared elevated depressive symptoms, support existing proposals that depressed mothers may not represent a homogenous group (Weinberg and Tronick 1998). These distinctions illustrate the importance of a person-centered approach because they allow for the investigation of patterns of concurrent interacting characteristics within individuals.

The second goal of this study was to examine the maternal profiles as they were associated with child emotion expression. It was revealed that the maternal profiles were related to positive observed emotion expression during the clean-up task and negative emotion expression during the Elmo task, illustrating that context is important when considering the maternal influence on child emotion expression. As expected, the Happy mothers (high levels of positive emotion expression and emotionality) had children who were more likely than those of the Melancholic and Struggling mothers (lower positive emotionality) to display positive emotion during the

negative emotion eliciting clean-up task. Unexpectedly, the children of the Stressed mothers also displayed higher positive emotion in this task. Although the Stressed mothers had high depressive symptoms and stress, their high positive emotionality may help provide a positive emotional climate for the child. The Melancholic and Struggling mothers, who reported low positive emotionality, had children who displayed low positive emotion during the task. This suggests that these children may have difficulty up-regulating positive emotion during a negative emotion eliciting task. It is possible that they have learned the general flattened positive emotion modeled by their mothers (Morris et al. 2007), and have not developed the skill of up-regulating positive emotion during a negative experience (Silk et al. 2006b).

We also expected to find associations between maternal profiles characterized by high levels of negative emotionality, stress, and depressive symptoms and child negative emotion expression. The children of the Struggling mothers, who shared all of these negative characteristics, were more likely to express negative emotion during the positive emotion eliciting Elmo task than children of the other groups, a finding typically obtained using variable centered methods. However, the children of the Melancholic and Stressed mothers, who shared only some of these negative characteristics, were not more likely to express negative emotion. Extending the notion that depressed mothers do not represent a homogeneous group, these findings suggest that children of mothers with elevated depressive symptoms do not experience uniform risk.

Finally, it was expected that high levels of negative emotionality, stress, and depressive symptoms would be related to greater child problem behaviors that are commonly associated with emotional development. This was supported by the Struggling profile, whose mothers shared these characteristics, and whose children had the highest levels of emotional reactivity, anxious/withdrawn symptoms, withdrawal, and aggressive behavior. Children of the Stressed mothers also showed high levels of these problem behaviors, although these mothers did not share all of the negative features, particularly negative emotionality. In contrast, the children of the Melancholic mothers did not show greater problem behaviors, even though their mothers shared some of the negative characteristics.

Perhaps, the distinction implicated by this outcome is the higher stress experienced by the Stressed mothers but not the Melancholic mothers. These findings highlight maternal stress, which may often co-occur with depressive symptoms (Hammen 2005), as a contributing factor in the association between maternal depressive symptoms and child problem behaviors (Feldman et al. 2004), while negative emotionality without the presence of stress may be less detrimental.

Notably, it was unexpected that the Struggling mothers would display the highest levels of positive emotion expression on both of the observational tasks. One possible explanation for this finding may be that, given these mothers' overall experiences with high levels of general negative emotionality, stress, and depressive symptoms, an opportunity to engage in a structured, one-on-one interaction with their children might have represented an uncommon occurrence in their day-to-day lives. It is also possible that since these mothers rated their children high on problem behaviors, they felt the need to be especially positive in a situation in which they and their children were evaluated. Inconsistent with the mothers' emotional expressions, the children of the Struggling mothers tended to display low positive and high negative emotions. This suggests a lack of emotion matching between mother and child or maternal insensitivity to the child's emotional state, which is consistent with the previous finding that depressed mothers respond less contingently to their children's distress (Shaw et al. 2006). Maternal responsiveness to child emotions has also been linked to greater child emotional competence (Denham et al. 1997), thus our findings suggest that the Struggling mothers' incongruent emotional expressions may contribute to their children's experience of risk.

Limitations

These results need to be considered in light of several limitations to this study, in particular its cross-sectional design. This limits the ability to draw causal conclusions regarding the maternal profiles and child outcomes. However, the results are in line with theories and models concerning these and similar constructs (e.g., Morris et al. 2007; Weinberg and Tronick 1998), lending support for their generalizability. Identifying the co-occurrence of maternal and child characteristics is valuable to our understanding of the mother-child relationship, but future research should investigate these characteristics developmentally across time.

With regard to the measures utilized, the separate coding of child anger, sadness, and fear could not be utilized because these emotion expressions did not occur with enough frequency. Due to this, the child negative emotions were aggregated, and expression was coded as a dichotomous variable (present, not present). Additionally, most mothers expressed little to no negative emotion in the lab tasks so only self-report of maternal negative emotionality could be utilized when creating the

profiles. Perhaps a greater variety of emotion eliciting tasks with longer durations would result in a wider range of observed negative emotions. It is also possible that the interaction tasks were too brief to prompt a wide range of negative emotion expression. Furthermore, the laboratory setting might have influenced how mothers interacted with their children, and data gathered in the home or naturalistic environments might more accurately represent average maternal interaction patterns. This was particularly a concern for the Struggling mothers, as their general reported emotionality did not tend to match their laboratory observed positive emotion expression.

Similarly, while it is a strength of this study that it utilized both observed and reported assessments, only self-report measures were available for some variables. The study might have benefitted by incorporating different measurement approaches, such as interviews or a wider variety of observational tasks. Specifically, only maternal report ratings were available for measures of child behavior problems, and it is possible that they may have been biased by the mothers' perceptions. For example, the children of the Stressed mothers showed more problem behaviors, though this may have been because these mothers perceived their children's behaviors to be worse due to their elevated stress levels. Of course, equally possible is that these children behaved badly due to contextual factors related to their mothers' stress, which then exacerbated these symptoms. Future research should consider multiple reporting perspectives, such as daycare providers. Finally, while this study aimed to consider multiple factors when defining the maternal profiles, other family considerations should be taken into account in future research. For example, maternal depression is often highly related to marital conflict (Essex et al. 2003), and this or significant life events (e.g., illness, job stress) may have been contributing to mothers' experiences, including stress and depressive symptoms.

Conclusion and Implications

The maternal role in child emotion socialization is especially important and influential. This study utilized a person-centered approach in order to identify different groups of mothers that shared emotion related characteristics. Four distinct profiles were found, three of which were characterized by elevated depressive symptoms and a mix of other generally negative features. The findings highlighted significant differences in patterns of maternal interaction and co-occurring characteristics that would not have been identified using variable-centered methods. They allowed for meaningful distinctions to be made between features commonly shared by distressed mothers, including low positive/high negative emotionality and high stress and depressive symptoms. Furthermore, these profiles were also associated with varying patterns of child outcomes, which provide additional

support for the significance and relevance of the distinctions made by the profiles.

With a greater comprehension of the patterns by which mothers differ and how this impacts child development, interventions and trainings can be adapted to target those at risk. The results of the current study inform clinical practice by providing a more complete and complex understanding of the interconnected maternal characteristics that influence child emotional development. Characteristics such as depression and stress vary in relation to general emotion, and children may only experience certain risks when these maternal characteristics co-occur at differing levels. This suggests that it may be possible for clinicians to tailor interventions according to patterns of emotional and contextual factors in order to alleviate child risk. For example, a clinician may work with a mother experiencing depressive symptoms concurrently with parenting stress on her parenting behaviors or coping skills to alleviate the stress. While this intervention may not directly address her depressive symptoms, it might reduce the risk that her child may experience. In all, a more complete conceptualization of the ways in which mothers differ and how these variations influence their children will allow for a better understanding of how to encourage positive, adaptive child development.

Conflict of Interest The authors declare that they have no conflict of interest.

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