



# How do New Mothers who were Exposed to Child Maltreatment Parent? A Canadian Feasibility Study

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## Abstract

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The primary objective of this study was to identify challenges in the identification of the sample, enlistment and recruitment of participants, and the feasibility of measures examining parenting in new mothers with a history of maltreatment in childhood. Participants were thirty first-time mothers, unselected for maltreatment history, and their three-month-old infants. We examined mothers' own history of child maltreatment in relation to emotional well-being, maternal warmth and sensitivity, and neuroendocrine activity in both mother and child. Mothers who reported experiencing maltreatment in childhood scored higher on self-reported Eysenckian psychoticism and rated their infants higher on distress to limitations than did mothers who did not report maltreatment in childhood. Mothers higher on emotional well-being exhibited greater decrease in salivary cortisol and reported more smiling and laughter in their infants. Feasibility issues are examined that stand to inform the design of future studies on a larger scale.

**Key Words:** child maltreatment, mother-child interactions, parenting, salivary cortisol

## Introduction

Although still highly under-reported, the incidence of child abuse in North America is cause for concern. In the United States, more than three million allegations of child abuse are reported each year (Teicher, 2002). In 2003, more than 200,000 allegations of child abuse were reported in Canada (Trocmé et al., 2005). In both countries, sufficient evidence has been collected to substantiate approximately half of these cases. Reported incidents span five types of maltreatment including physical abuse (PA), emotional abuse (EA), exposure to domestic violence, sexual abuse (SA), and neglect, with the three former categories being the most reliable across substantiated Canadian cases in 2003 (Trocmé et al., 2005).

Maltreatment in childhood can be experienced acutely or chronically, the trauma of which invariably triggers the body's stress response. The impact of severe stress in the form of abuse can be associated with enduring effects in terms of brain structure and function; many of these observed changes are related to aspects of the stress response. Thus, it is thought that dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis may underlie the subsequent development of some disorders. Such dysregulation has been observed in child and adult sur-

vivors of maltreatment both with and without psychiatric diagnoses (Bremner et al., 2003; De Bellis et al., 1994; Heim et al., 2000, 2001; Heim & Nemeroff, 2001; Kaufman, 1997;). Victims of abuse are at greater risk for the development of many types of psychopathology, including internalizing conditions such as major depressive disorder (MDD; MacMillan et al., 2001) and post-traumatic stress disorder (PTSD; Heim et al., 2001; Kessler et al., 1997).

It is generally believed that exposure to maltreatment in childhood increases the risk for later abusive parenting in women. To date, the hypothesis of intergenerational transmission has been used as a platform for much research, with little corroborative evidence to support the phenomenon. Such studies have focused mainly on physical abuse, and cite transmission rates between 7% to 70%, with a generally accepted rate of approximately 30% (Kaufman & Zigler, 1987). Consequently, with the nature of parenting confined to transmission, little attention has been paid to all other facets of parenting that contribute to the well-being of the mother-infant relationship, such as parent (personality, emotional well-being, parenting style and beliefs), child (temperament, neuroendocrine function), and family (socio-economic status, social support) factors. It is not clearly understood why some mothers with a history of maltreatment suffer great difficulty in parenting, while others do not (Zuravin et al., 1996). Exploration of resilience in individuals with a history of maltreatment has begun to show that negative outcomes are not universal and that women tend to be more resilient than men (DuMont et al., 2007; McGloin & Widom, 2001).

## *Role of the early caregiving environment*

It is now widely accepted that the quality of early family life and caregiver interactions has a great impact on later health. The most compelling evidence for the effect of early caregiving environment on later outcomes comes from preclinical models that substantiate the influence of parenting on the developing brain and stress responses of offspring. There is nonhuman animal evidence that parental care can affect endocrine and autonomic responses to stress that endure into adulthood (Meaney & Szyf, 2005). In rats, this effect is thought to be mediated by the influence of maternal care on gene expression, which produces downstream effects on the HPA axis. Further, this behavioral programming has been shown to be reversible via cross-fostering (Weaver et al., 2004).

Hane and Fox (2006) sought to extend Meaney's work to humans by examining the effect of variations in maternal care on infant stress reactivity. Relative to infants who experienced high-quality maternal care behavior, infants in this study who experienced low-quality maternal care behavior displayed significantly more fearfulness during the presentation of novel stimuli, less positive joint attention to a shared object, and more right frontal EEG asymmetry (a marker of stress associated with behavioral inhibition and withdrawal behavior). Taken together with previous research, these findings provide support for the critical role of early maternal caregiving quality in shaping behavioral development in both animal and human offspring.

It is thought that human infants develop emotion regulatory skills, or become behaviorally and physiologically organized, in the context of early mother-infant interactions (Field, 1994). An optimal mother-child relationship provides a child with a secure base from which he/she can explore the world. Maternal warmth and sensitivity are two key features of parental care that help to organize early secure base behavior in offspring. Ainsworth et al. (1974) considered sensitivity/insensitivity to be the most important dimension of caregiving behavior. It has been hypothesized (Gunnar, 1998) that the buffer of the human infant HPA axis is the security of attachment to the primary caregiver. Sensitive and responsive caregiving, which is thought to lead to secure attachment (Sroufe, 1983), has been shown to buffer the stress response in toddlers. Toddlers with insensitive and unresponsive caregiving have been shown to have larger cortisol responses to stress (Gunnar, 2006). Impoverished early interactions can lead to disruptions in attachment. Child maltreatment, for instance, can be thought of as an extreme

form of insensitive caregiving where, in terms of intergenerational continuity/discontinuity, it is the caregiving relationship that is transmitted across the generations, rather than the violence, per se (Buchanan, 1996). Research examining the quality of the mother-infant relationship and stress reactivity has documented that disorganized attachment is associated with higher concentrations of salivary cortisol in infants (Hertsgaard et al., 1995), suggesting that variations in maternal care may underlie the development of stress reactivity systems in humans.

## ***The present study***

There is a large body of research that has examined the effects of maltreatment on outcomes in high-risk clinical groups. However, we know little about the relations among exposure to child maltreatment and later parenting among nonclinical samples of adult women. Building on what is known with clinical populations, issues of risk and resiliency can be explored, and may be more generalizable, by looking at the phenomenon in unselected community samples. By enlisting first-time mothers, it is possible to investigate the relation between early exposure to abuse and later outcome in both mother and child. However, in part (due to the inherent sensitivity of the issue and the delicate state of post-partum mothers and their infants, it is important to assess the feasibility of core issues around conducting such work in the community.

The primary goal of the present study was to identify challenges in the identification of the sample, enlistment and recruitment of participants, and the feasibility of measures examining parenting in a community sample of new mothers. We examined mothers' past history of child maltreatment in relation to emotional well-being, maternal warmth and sensitivity, and neuroendocrine activity in both mother and child. Social and demographic factors identified previously in the literature to be potential confounds were explored.

## ***Hypotheses***

We hypothesized that a maternal history of maltreatment would be positively correlated with poorer maternal functioning and more impoverished mother-child interactions broadly defined as including decreased maternal emotional well-being, increased HPA axis dysregulation (i.e. elevated salivary cortisol), decreased maternal warmth and sensitivity in mother-child interactions (i.e., decreased sensitivity to the infant's signals, greater interference with the infant's ongoing behavior, decreased physical and psychological maternal availability, and increased rejection of the infant's needs), and greater maternal perception of the infant as temperamentally difficult. We also thought that mothers with a history of maltreatment would report greater stress in their role as a parent, report greater belief in parenting attitudes known to be associated with child abuse, and report less social support from family, friends, and significant other.

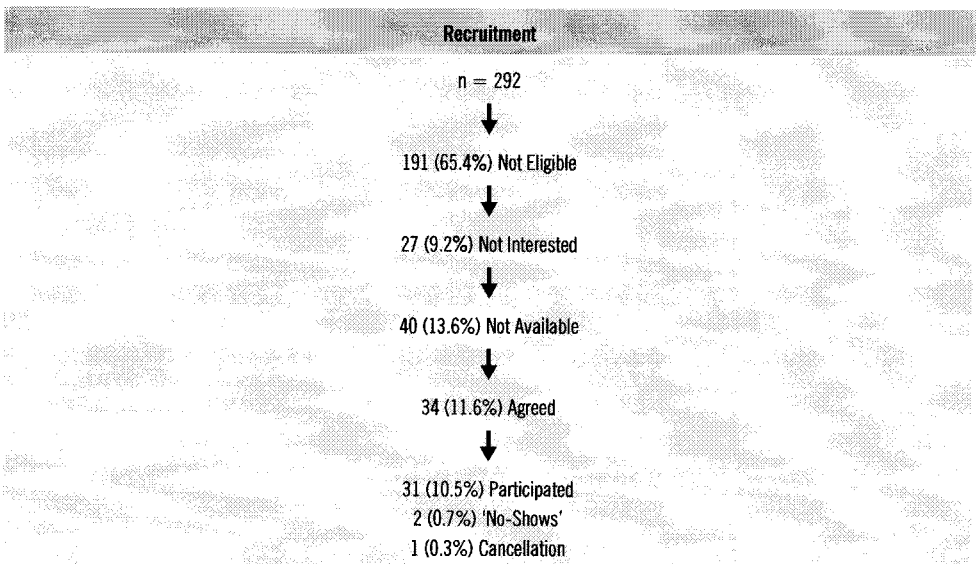
## **Method**

### ***Participants and sample overview***

Contact information for women who, subsequent to giving birth at McMaster University Medical Centre and St. Joseph's Hospital in Hamilton, Ontario had agreed to be contacted for research studies was obtained from the Child Database in the Department of Psychology, Neuroscience, and Behavior at McMaster University. A total of 292 women (121 who had given birth

at McMaster University Medical Centre (MUMC) and 171 who had given birth at St. Joseph's Hospital, Hamilton, Ontario during the months of June, July, and August, 2006) were contacted by telephone to participate in the study. Women met inclusion criteria if they were 18 years of age or older, first-time mothers of a healthy singleton, had custody of the child and no protective service involvement, and were fluent in English. Exclusion criteria included maternal characteristics that did not allow for completion of study measures (i.e., severe mental retardation, severe brain injury, severe psychosis, drug-induced stupor), premature birth of the infant (i.e., < 37 weeks gestation), low birthweight of the infant (i.e., < 2500 grams), and neonatal intensive care. The sample was not selected for history of maternal maltreatment in childhood. Of the 292 mother-infant dyads contacted, 31 (10.6%) dyads ( $n = 17$  females,  $n = 14$  males; 18 from MUMC and 13 from St. Joseph's Hospital) participated in the home visit. It was determined that one woman (recruited from MUMC) who participated in the home visit had child protective service involvement; she was excluded from the sample, leaving a total of 30 women who met all inclusion criteria. Women whose infants were approaching three months of age were contacted by telephone and were invited to participate in a research study investigating women's health issues in first-time mothers if they met the above inclusion criteria. For women who agreed to participate, home visits were booked to coincide as closely as possible to the infants' three-month birthdate ( $M = 93.97$  days,  $SD = 7.15$  days). See Table 1.

**Table 1**  
Recruitment Overview.



Mothers and their infants were visited in their homes, primarily in the morning (20 morning visits, 12 afternoon visits, 1 evening visit), a time that, according to the mother, that the infant was expected to be awake and alert. The women were briefed about the procedures and then written consent was obtained. All procedures were approved by the McMaster University Health Sciences Research Ethics Board.

Mothers were asked to refrain from eating for at least one hour prior to the visit to allow for clean saliva sample collections; infants' last time of eating was documented (8 infants fed before first sample collection, 11 infants fed before second sample collection, 3 fed before both sample collections).

## ***Maternal psychiatric assessment***

Maternal psychiatric status was assessed using the Mini International Neuropsychiatric Interview (M.I.N.I.) (see Sheehan et al., 1997 for reliability and validity information). Psychiatric modules covered by the M.I.N.I. include major depressive episode, dysthymia, suicidality, manic episode, hypomanic episode, panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, post-traumatic stress disorder, alcohol dependence and abuse, substance dependence and abuse, psychotic disorders, anorexia nervosa, bulimia nervosa, generalized anxiety disorder, and antisocial personality disorder.

## ***Exposure to maltreatment measures***

Mothers were asked to report on their experiences of maltreatment in childhood. Five categories of maltreatment were explored including physical abuse, sexual abuse, emotional abuse, emotional neglect, and physical neglect. Mothers reported on past physical and sexual abuse using the 21-item Childhood Experiences of Violence Questionnaire (Wekerle et al. 2006; see Walsh et al., in press, for reliability and validity information). Physical abuse or sexual abuse prior to the age of 16 was scored according to the criteria defined in the CEVQ.

Mothers reported on emotional abuse, emotional neglect, physical neglect, and physical and sexual abuse in childhood using the 28-item Childhood Trauma Questionnaire (CTQ) (see Bernstein et al., 2003, 1994 for reliability and validity information). Each abuse category was defined using the 'low to moderate' classification of the CTQ. This measure is scored on a 1 (never true) to 5 (very often true) metric. Minimum subscale scores of 8, 6, 9, 10, and 8 out of 25 were required to meet criteria for having experienced physical abuse, sexual abuse, emotional abuse, emotional neglect, or physical neglect, respectively in childhood.

## ***Maternal report of parenting attitudes and social support***

Mothers were asked to report on their parenting attitudes and child rearing practices using the Adult Adolescent Parenting Inventory (see Bavolek & Keene, 1999 for reliability and validity information). The purpose of this inventory is to determine the degree to which mothers agree or disagree with parenting behaviors and attitudes thought to contribute to child abuse and neglect.

Mothers reported on their perceived stress related to parenting via the Parenting Stress Index Short Form (PSI-SF) (see Abidin, 1995 for reliability and validity information). Finally, mothers were asked to report on their perceived social support from friends, family, and significant other using the Multidimensional Scale of Social Support (see Zimet et al., 1988 and Zimet et al. 1990 for reliability and validity information).

## ***Maternal personality and emotional well-being measures***

Mothers were asked to complete questionnaires pertaining to their own personality and emotional well-being, including measures of shyness, sociability, extraversion, neuroticism, psychoticism, behavioral inhibition and activation, loneliness, and self-esteem.

### **Cheek and Buss Shyness and Sociability**

The Cheek and Buss shyness and sociability scale is a 10-item scale that is used to index shyness and sociability (Cheek, 1983; Cheek & Buss, 1981). The Cheek and Buss Shyness and Sociability Scale has excellent reliability and validity properties (Bruch et al., 1989; Cheek & Buss, 1981).

### **Eysenck Personality Questionnaire-Revised Short Form**

The Eysenck Personality Questionnaire-Revised Short Form (EPQ-RS) is a 48-item questionnaire that is used to measure the personality dimension of neuroticism, extraversion, and psychoticism (Eysenck, Eysenck, & Barrett, 1985; Eysenck & Eysenck, 1991). The EPQ-RS also includes a lie scale, which is a measure of social desirability. The EPQ-RS is a psychometrically sound measure with ample test-retest reliability and internal consistency (25, 26).

### **UCLA Loneliness Scale**

The Revised-University of California, Los Angeles (R-UCLA) loneliness scale is composed of 20 items, which are answered on a 0 (“extremely uncharacteristic”) to 4 (“extremely characteristic”) metric (Russell, Peplau, & Cutrona, 1980). Reliability and validity are reported in Russell et al. (1980).

### **Carver and White Behavioral Inhibition/Behavioral Activation Scales**

The behavioral inhibition scale (BIS)/behavioral activation scale (BAS) is a 20-item scale that measures dispositional sensitivities of 2 motivational systems: a behavioral inhibition or withdrawal system and a behavioral activation or approach system (Carver & White, 1994). Lower scores on the BIS scale indicate increased inhibition, and lower scores on the BAS scale indicated increased activation. The score for the BAS scale is a composite of 3 subscales: drive, reward responsiveness, and fun-seeking. Psychometric data for the BIS/BAS are presented elsewhere (Carver & White, 1994).

### **Coopersmith Self-esteem Scale**

The Coopersmith self-esteem scale is a 25-item self-report measure answered on a dichotomous scale (“like me” or “not like me”) (Coopersmith, 1967). The relevant reliability and validity data for the scale have been presented by Coopersmith (1967).

## ***Maternal report of infant behavior***

Mothers were asked to rate their child’s behavior using the 94-item Infant Behavior Questionnaire (Rothbart, 1981; see also Rothbart, 1986 for reliability and validity information) this questionnaire was included in the package that was mailed to participants); subscales of this measure include activity level, fear, distress to limitations, smiling and laughter, soothability, and duration of orienting.

## ***Direct observation procedures and measures***

Maternal warmth and sensitivity were measured as mothers and their infants took part in a 20-minute videotaped freeplay session. Twenty-nine women completed the video-taped behavioral interaction; one woman felt uncomfortable with the videotaping and, therefore, completed only 2 minutes.

Ainsworth’s Maternal Sensitivity Scales (Ainsworth, 1978) were used to examine the quality of early maternal care within four parameters: 1) sensitivity to infant signals, 2) cooperation versus interference with ongoing behavior, 3) psychological and physical availability to the infant, and 4) acceptance versus rejection of the infant’s needs. Maternal behavior is scored on a 1 (low) to 9 (high) scale. Videotapes were coded independently by 3 coders, two of whom were blind. The first coder coded all 29 tapes and was not blind. The second and third coders coded a total of 23 tapes, 5 on which they overlapped. Inter-rater reliability ranged from  $r = 0.71$  to  $r = 0.87$ .

## *Neuroendocrine procedures and measures*

### **Saliva collection**

During the home visit, both mother and child provided two salivary samples for later cortisol analysis. Steroid levels in saliva are a valid reflection of the concentration of the unbound (biologically active) levels found in the blood (Kirschbaum et al., 1995). For mothers, the samples were obtained by passive drool into sterile plastic tubes; each sample comprised approximately 1 ml of saliva. For infants, the samples were collected with Sorbettes (Salimetrics LLC; two Sorbettes were used per sample in order to collect a sufficient quantity of saliva) and placed into sterile plastic tubes; each sample comprised approximately 1 ml of saliva. Mothers and infants provided salivary samples at two time points: the first at the beginning of the home visit, after obtaining written consent, and the second at the conclusion of the visit, after completion of study measures. Two of the infants fell asleep at the time of saliva collection prohibiting collection of the second salivary sample. Samples were stored at -20 degrees Celsius until assayed.

### **Cortisol assaying**

Saliva hormone concentrations were determined by enzyme immunoassay (E.I.A.) procedures using commercially available kits (Salimetrics, LLC: State College, PA, U.S.A.). The average correlation coefficient for four assays was 0.999. The intra- and inter-assay variations reported by Salimetrics, LLC were 3.5% and 5.08%, respectively. Time of day was not related to abuse status, however, it was related to cortisol value; subsequent analyses were, therefore, performed and are reported both with and without controlling for time of day. It is important to note that the cortisol levels of one mother-infant dyad were between three and five standard deviations above the mean. Accordingly, the dyad was omitted from all cortisol analyses presented.

## **Results**

### *Descriptive Statistics*

A total of 30 mothers (mean age = 28.9 years, SD = 5.51) and their infants (mean age = 93.97 days, SD = 7.15) participated in this study (see Table 2). Thirteen mothers reported experiencing physical abuse in childhood, 6 reported experiencing sexual abuse, 14 reported experiencing emotional abuse, 10 reported experiencing emotional neglect, and 4 reported experiencing physical neglect. 46.7% of mothers reported the experience of two or more abuse types in childhood.

### *Between-group comparisons*

Using the CTQ and the CEVQ, dichotomous groups of abuse ( $n = 20$ ) vs. no-abuse ( $n = 10$ ) were created. Independent-samples  $t$  tests were then conducted to examine between-group differences on outcome measures.

#### **Parental stress**

On the PSI-SF, a trend [ $t(24.81) = -1.90, p = .070$ ] was observed for greater report of maternal parental distress in the Abuse ( $M = 27.56, SE = 2.04$ ) versus No-Abuse ( $M = 23.00, SE = 1.27$ ) group.

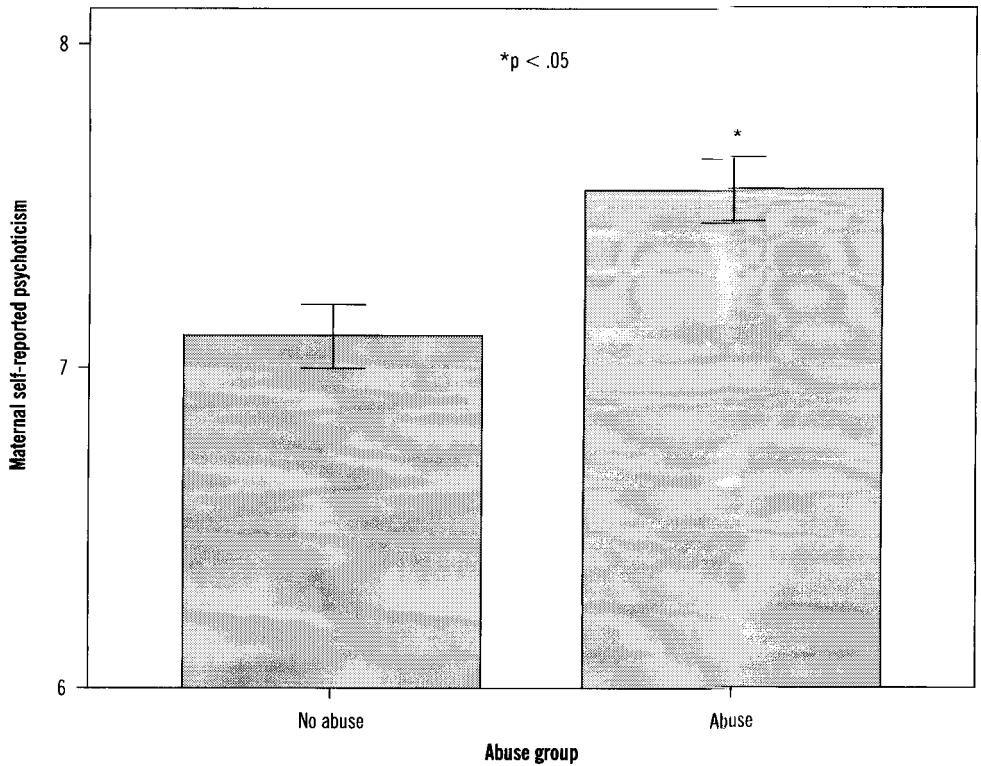
## Maternal personality

The Abuse versus No-Abuse groups differed significantly [ $t(27.93) = -2.46, p = .020$ ] on maternal self-report of psychoticism, such that the Abuse group reported a greater degree of psychoticism ( $M = 7.55, SE = .15$ ) than did the No-Abuse group ( $M = 7.10, SE = .10$ ; see Figure 1). No further between-group differences were observed.

**Table 2**  
Participant demographic information.

Question	Response Options	Frequency
Are you currently:	A single parent?	3
	Living with a spouse/partner?	27
What is your spouse/partner's relationship to your child?	Biological father	26
	Other	1
What type of delivery did you have?	Vaginal	18
	C-section	12
Are you currently:	Breastfeeding?	14
	Bottle-feeding (formula)?	11
	Both of the above?	5
Have you taken prescription medication in the past year?	No	16
	Yes	14
In what country were you born?	Canada	26
	Other	4
What is the highest grade or level of education you have ever completed?	No schooling	0
	Some elementary school	0
	Completed elementary school	0
	Some secondary or high school	1
	Completed secondary or high school	1
	Some community or technical college, CEGEP, or nursing program	4
	Completed community or technical college, CEGEP, or nursing program	10
	Some university or teachers' college	3
	University degree or teacher's college	9
Did you work at a job or business at any time during the past year?	No	2
	Yes; full time (30 or more hours per week)	24
	Yes; part-time	3
	Both of the above	1
Which of the following categories represents the total family income, before taxes, for the last year? Please include income from all sources such as wages, salaries, commissions, pensions, family allowances, rental income and so forth.	Less than \$15,000	2
	\$15,000-\$30,000	3
	\$30,000-\$45,000	5
	\$45,000-\$60,000	0
	\$60,000-\$75,000	5
	\$75,000-\$90,000	3
	\$90,000-\$100,000	3
Greater than \$100,000	9	





**Figure 1**  
Maternal self-report of psychoticism on the Eysenck Personality Questionnaire by abuse group.

### Infant temperament

A significant difference [ $t(25) = -2.05, p = .05$ ] was observed between the Abuse ( $M = 3.27, SE = .16$ ) and No-Abuse ( $M = 2.74, SE = .19$ ) groups on maternal report of infant distress to limitations.

No significant between-group differences emerged for parenting attitudes on the AAPI, social support on the MSPSS, neuroendocrine function or maternal warmth and sensitivity.

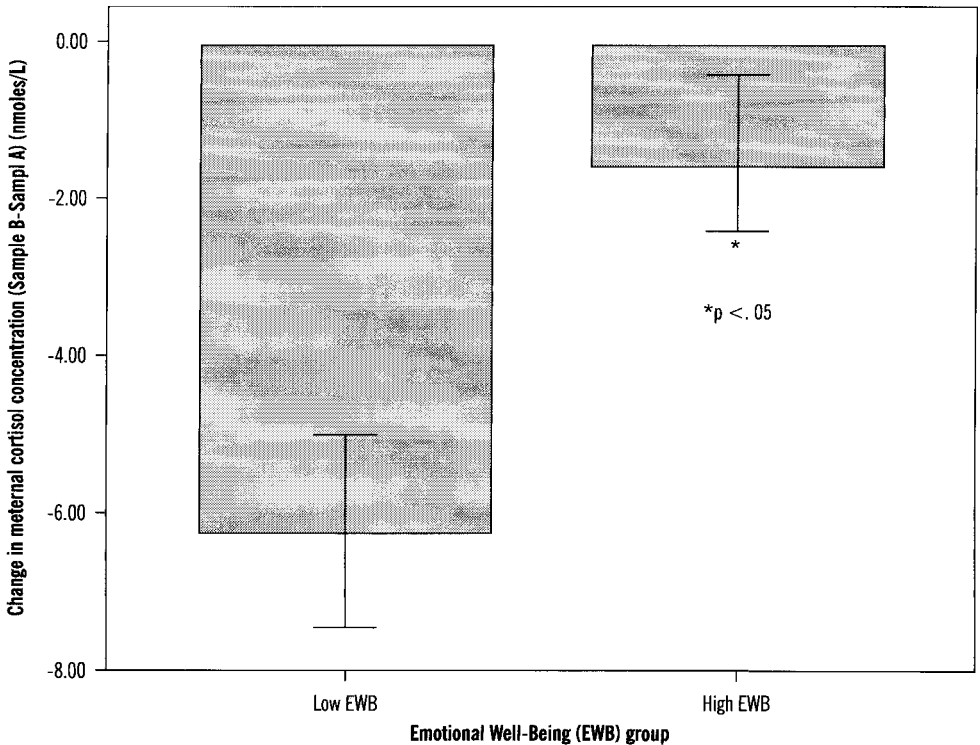
## Maternal emotional well-being

Exploratory post-hoc analyses were performed to examine the influence of maternal emotional well-being, independent of abuse history. A composite score of general maternal emotional well-being (EWB) was created by collapsing across the maternal report of self-esteem and loneliness categories which were highly correlated ( $r = -.73, p < .001$ ). Mothers' EWB scores were dichotomized into high and low groups using the median split of this scale. Differences between the High EWB group and the Low EWB group were then examined for mother and infant neuroendocrine function, maternal warmth and sensitivity and maternal report of infant temperament both with and without statistically controlling for time of day of cortisol sampling where appropriate.

### Maternal neuroendocrine function

Mothers' cortisol concentration in the first saliva sample, second saliva sample, and the average between the two samples did not differ significantly between High and Low EWB groups,

both with and without controlling for time of day. The change in mothers' cortisol concentration between the two samples, however, differed significantly between groups (see Figure 2). First, without controlling for time of day, the Low EWB group exhibited a greater decrease in cortisol ( $M = -5.73, SE = 1.23$ ) than did the High EWB group [ $M = -2.04, SE = 1.27; F(1, 27) = 4.36, p = .046$ ]. The same was also true when time of day was controlled [ $F(1, 25) = 7.54, p = .011$ ]; the Low EWB group exhibited greater decrease in cortisol ( $M = -6.20, SE = 1.16$ ) than did the High EWB group ( $M = -1.54, SE = 1.20$ ). Overall, the Low EWB group exhibited a greater decrease in cortisol from sample 1 to sample 2.



**Figure 2**  
Change in maternal salivary cortisol concentration in nmoles/L by Emotional Well-Being group.

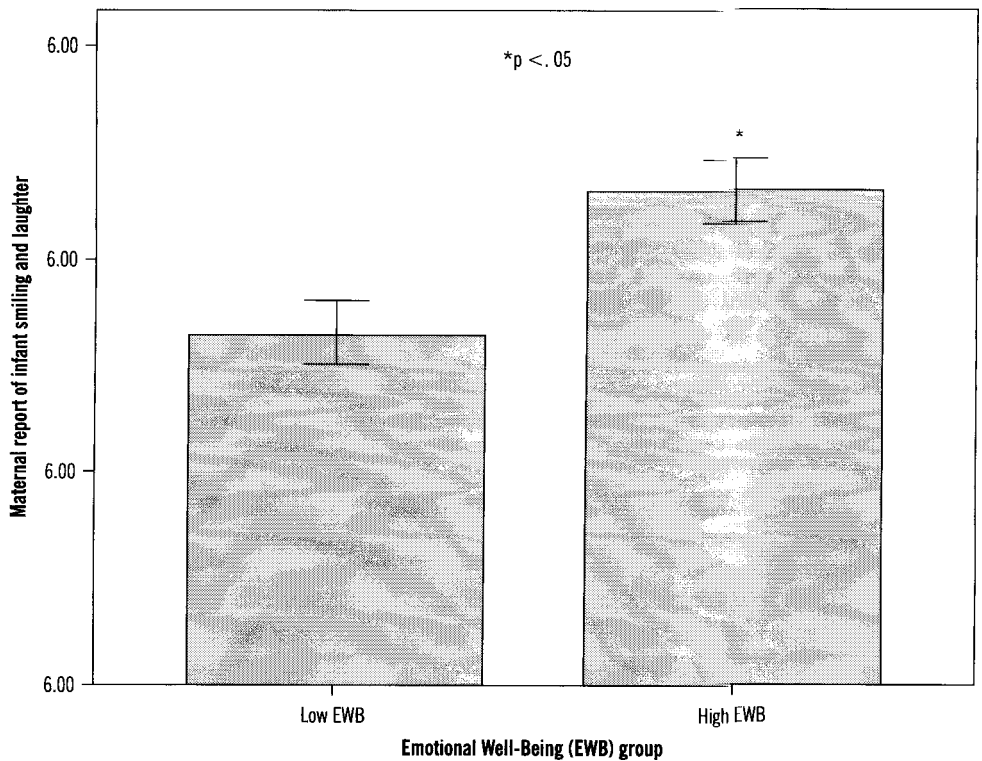
### Maternal warmth and sensitivity

A trend toward a significant difference in maternal sensitivity was observed [ $F(1, 27) = 3.24, p = .083$ ] between the Low EWB group ( $M = 6.19, SE = .33$ ) and the High EWB group ( $M = 7.08, SE = .37$ ). Global maternal warmth and sensitivity did not differ significantly between groups. Overall, a trend was observed toward greater maternal sensitivity in mothers' reporting greater EWB.

### Maternal perception of infant temperament

The Low EWB group ( $M = 4.85, SE = .19$ ) differed significantly from the High EWB group ( $M = 5.43, SE = .19$ ) in maternal report of infant smiling and laughter [ $F(1, 25) = 4.77, p = .036$ ]. Overall, mothers high on EWB reported more smiling and laughter in their infants (see Figure 3).

There were no significant between-group differences on infant neuroendocrine function.



**Figure 3**  
Maternal report of infant smiling and laughter on the Infant Behavior Questionnaire by Emotional Well-Being group.

### *Feasibility considerations*

A total of 292 women were contacted to recruit a sample of 30 first time mothers and their infants who met all study inclusion criteria and agreed to participate. The main reason for ineligibility was having more than one child. Feedback from mothers was that they preferred being visited in their home versus a laboratory setting due to convenience. The home visit also provided a comfortable setting for the mothers to report on sensitive issues. Mothers who agreed to participate in the study were receptive to the nature of the study and did not indicate any discomfort with the content and range of questions they were asked.

Three mothers chose not to participate in the study due to apprehension surrounding the videotaped behavioral interaction. Further, some mothers who agreed to participate in the study also communicated feelings of nervousness around this same issue; they seemed to feel more at ease when they were reminded that they need only play with their baby in a manner that was typical for them and that they were not being judged on their parenting style.

The combined selection of study measures permitted the home visit to be completed in approximately 2 hours. This seemed to be an appropriate amount of time for both mothers and infants, which did not interfere with their daily activities. Home visits were booked around a time that mothers felt was a reliable time for their infants to be awake. Therefore, collection time for salivary cortisol in mother and child varied. While visits were booked for a time that mothers felt was a reliable time for their infants to be awake, two infants fell asleep prior to collection of their second salivary sample. Further, while mothers were asked to refrain from eating or drinking prior to salivary cortisol collection, the same could not be controlled for in-

infants; most infants ate either before collection of the first sample, the second sample, or prior to both. A further issue was whether infants were fed breast milk or formula (or both). Thus, infant salivary cortisol findings must be interpreted with great caution.

The main consideration in choosing a measure of maternal warmth and sensitivity was the infants' young age. Infants were too young to examine attachment with Ainsworth's strange situation paradigm (typically 12 months of age and up) and also too young for the Maternal Behavior Q-Sort (MBQS) method. Therefore, Ainsworth's scales were selected to examine maternal warmth and sensitivity due to the contingency on mothers' reactions to infants' cues without any expectation placed on the infant. While this was a good fit with infant age range, it was sometimes difficult to assess maternal warmth and sensitivity due to lack of variability in observed in the dyads' behavior during the brief 20 minute observation. Future work might seek to extend this period of observation, conduct repeated observations, or to examine coherence between observation in the home versus laboratory setting.

## Discussion

### *Abuse prevalence in a community sample of first-time mothers*

A total of 30 mother-infant dyads participated in the current study. Women were first-time mothers recruited from the community and were unselected for a history of maltreatment in childhood. The prevalence of any type of abuse in this sample was 66.6%; 43.3% of mothers reported a history of PA and 20% reported a history of SA. Results from the Ontario Health Supplement (MacMillan et al., 1997) indicated that in a sample of 9953 respondents, the prevalence of PA and SA in women 15 years of age and older was 21.1% and 12.8%, respectively. Similarly, the prevalence of PA was higher than that of SA in this sample.

### *Between-group difference findings*

#### **Abuse versus no-abuse**

The overarching hypothesis of this study was that a maternal history of maltreatment in childhood would be associated with poorer functioning in both mother and child. Here, "poor" functioning was broadly defined as including decreased maternal emotional well-being, increased salivary cortisol in both mother and child, decreased maternal warmth and sensitivity toward the infant, and greater maternal perception of the infant as temperamentally difficult. It was also thought that mothers with a history of maltreatment would report greater stress in their role as a parent, report greater belief in parenting attitudes known to be associated with child abuse, and report less social support. To explore these variables, dichotomous groups of abuse, no-abuse were created and permitted the greatest statistical power.

#### **Maternal personality**

Aspects of personality, affective style and emotional well-being have been associated with increased risk for psychopathology and increased stress reactivity. In particular, when behavior is conceptualized around the motivations of approach and withdrawal, it is the tendency to withdraw that is associated with increased behavioral inhibition and shyness and decreased emotional well-being and which is related to increased risk for some affective disorders. The experience of maltreatment is often associated with difficulty in emotion regulation. In this study, it was hypothesized that maternal self-reported personality and decreased emo-

tional well-being would be associated with exposure to maltreatment in childhood. More specifically, it was hypothesized that maternal history of maltreatment in childhood would be associated with increased self-report of personality characteristics associated with increased risk for psychopathology such as increased behavioral inhibition, shyness, psychoticism, neuroticism, and loneliness and decreased self-esteem and behavioral activation. As predicted, the abuse group reported a significantly higher degree of psychoticism than did the no-abuse group.

Studies of Eysenck's psychoticism dimension tend to focus on anti-social and delinquent behaviors rather than emotional well-being. However, in a sample of adolescent females, psychoticism has been found to be related to and predictive of decreased positive affect and emotional well-being (Ciarrochi & Heaven, 2007).

### **Salivary cortisol**

Some of the most compelling evidence illustrating the impact of the early rearing environment on brain development comes from animal models demonstrating the role of maternal care on the development of the stress response system of offspring (Meaney & Szyf, 2005). In humans, studies have focused on stress reactivity in relation to MDD and PTSD in child, adolescent, and adult victim populations (Shea et al., 2004); however, little work has been done investigating HPA axis function in victims and their offspring in relation to maternal caregiving behavior. In this study, it was expected that salivary cortisol concentration would be increased in mothers who reported a history of maltreatment in childhood and their infants, reflective of HPA axis dysregulation. However, when salivary cortisol concentration was examined in both mother and child, no differences were observed between groups. It may be that the small sample size did not allow for the detection of differences; a further confound was the heterogeneity in infant feeding and sleeping times, which have been shown to affect the concentration of salivary cortisol (Magnano et al., 1989).

### **Maternal warmth and sensitivity**

Maltreatment in childhood and decreased emotional well-being may confer risk for psychopathology that may later impact on the capacity to parent. In the past, studies that have explored a broader definition of parenting have typically involved mothers with a history of sexual abuse and have reported impairments (Douglas, 2000; Cohen, 1995; Cole et al., 1992; Burkett, 1991). Overall, in comparison to other parents, mothers with a history of abuse have been reported to have impoverished interactions with their infants (Browne & Saqi, 1988; Hyman, Parr, & Browne, 1979), have more unrealistic expectations of their child (Putallaz et al., 1998) and attribute more negative intentions to their child's behavior (Zeanah & Zeanah, 1989). While in this study it was predicted that decreased maternal warmth and sensitivity would be observed in the abuse group, no differences were observed between groups on any measure of maternal warmth and sensitivity. Again, it is possible that small sample size played a role in not detecting any between-group differences.

### **Maternal perception of infant temperament**

Mothers who reported experiencing maltreatment in childhood were expected to perceive their infants as more temperamentally difficult. Mothers in the Abuse group reported greater infant distress to limitations. Interestingly, infant proneness-to-distress temperament has been observed by Mangelsdorf et al. (1990) to be related to maternal personality in that once objective indices of infant emotional temperament were controlled, maternal personality was observed to influence maternal report of infant temperament.

### **Parenting attitudes, parental stress, and social support**

Past history of maltreatment is thought to be a risk factor for abuse of one's own children. Several parenting attitudes are also thought to be associated with increased risk for abuse of one's own children and it was hypothesized that mothers in the abuse group would report

greater belief in these. This was not the case, as no differences were observed between groups. Maternal report of parental stress was expected to be greater in the abuse versus no-abuse groups. A trend toward the abuse group reporting more parental distress than the no-abuse group was observed. Lastly, although maternal report of perceived social support was expected to be lower in the abuse group, no between-group differences emerged. With a larger sample size, group differences in maternal report of parental stress and social support would likely emerge.

## **Influence of Maternal Emotional Well-being**

First, it was expected that mothers who scored low on EWB would exhibit increased levels of salivary cortisol. Mothers in the Low EWB groups exhibited a greater decrease in salivary cortisol across the two samples; no between-group differences were observed in infant cortisol. Second, it was hypothesized that mothers who scored low on EWB would be less warm and sensitive toward their infants. A trend was observed toward decreased sensitivity in the Low EWB group. Third, mothers who scored low on EWB were expected to perceive their infants as more temperamentally difficult. Mothers in the Low EWB group reported less smiling and laughter in their infants than did mothers in the High EWB group. Therefore, between-group differences began to be elucidated in the predicted directions.

### ***Zero-order relations***

Although beyond the scope of results presented here, it was expected that relations among maternal and infant subjective, physiological, and behavioral outcome measures would be observed, independent of maternal abuse status. Correlations in the predicted directions were observed. For example, in mothers, increased well-being was related to increased warmth and sensitivity toward the infant, decreased perception of the child as difficult, increased perceived social support, increased belief in healthy parenting attitudes, and decreased parental stress. High maternal warmth and sensitivity were also related to cortisol concentration and degree of change across the two salivary samples, decreased perception of the infant as difficult, and increased perceived social support. Maternal salivary cortisol concentration was related to decreased perception of the infant as difficult, as well as to infant salivary cortisol concentration. Finally, infant salivary cortisol concentration was related to maternal self-reported personality and emotional well-being, increased maternal warmth and sensitivity, and decreased perception of the infant as difficult.

### ***Limitations***

It should be noted that results from this pilot study are preliminary and limited by the nature and size of the sample. Further, the issues that we discuss here are relevant within a North American context, but may be limited in generalizability across cultures. The greatest statistical power was achieved by grouping mothers who reported experiencing abuse of any type versus those who reported no experience of abuse in childhood. This has been cited in the literature as a limitation and emphasizes the need to explore issues of maltreatment in childhood on a larger scale. Further support for this comes from the fact that two thirds of the 30 mothers, randomly selected to participate in the study, reported having experienced one or more types of abuse in childhood; 12 women (according to the CEVQ) reported experience of severe abuse. A larger sample size would allow for exploration of issues of abuse type, chronicity, severity, and relationship of the perpetrator to the victim.

Limitations also emerged around the sampling of salivary cortisol. Because infants were required to be awake for at least part of the visit, sampling times for cortisol varied across visits. A further confound that was beyond the control of the experimenters was the varied feeding and sleeping times of infants; most infants were fed prior to at least one, if not both of the sample collections. Further, there was heterogeneity in feeding methods (ie. breastfeeding, formula bottle feeding, or a combination of both). This introduced error into the analyses and may explain why no between group differences were observed in infant cortisol.

## ***Interpretation of findings***

As predicted, important relations were observed between mothers' functioning and emotional well-being, neuroendocrine function in mother and child, maternal warmth and sensitivity, and maternal perception of the infant, independent of abuse status. This is important, as it suggests that the well-being of the mother is related to the way she interacts with and perceives her infant, and that her well-being, in turn, is related to her infant's functioning. Although this does not speak to the biological or behavioral bases of these associations, it does reflect the interrelatedness of these domains and how change in one may affect change in another.

Several findings began to emerge when differences were examined between mothers who reported experiencing abuse in childhood and those who did not. That some of the predicted differences between abuse groups did not (ie. maternal warmth and sensitivity, cortisol concentration) emerge may have been a function of the limited sample size, and hence statistical power. Further, as mentioned earlier, by creating dichotomous groups, a lot of information pertaining to onset, severity, and chronicity of the abuse is overlooked. Differences between groups based on the number of abuse types experienced were examined, as it is known that exposure to one type of abuse increases the risk for exposure to additional types of abuse. Differences were observed in maternal personality, salivary cortisol, warmth and sensitivity, perception of infant temperament, and social support. We advise caution in considering these findings, given the small sample sizes within each of the abuse groupings. A larger sample size would allow for delineation of the impact of experiencing one or more abuse types. The findings suggest that mothers' EWB is related to her neuroendocrine function, the quality of interaction with her infant, and her perception of her infant.

## ***Conclusions/Implications***

Although inherently challenging, research in the area of child maltreatment stands to benefit victims and society as a whole, as well as to broaden the understanding of the impact of early stress on brain development. The purpose of the current study was to identify challenges in the identification of the sample, enlistment and recruitment of participants, and the feasibility of measures examining parenting in a community sample of new mothers. We have sought to extend previous work by looking at the impact of childhood maltreatment in mothers as it related their functioning and to subsequent parenting of and functioning in their infant. Although the results we report here are preliminary, we attempted to highlight issues of risk and resiliency as well as confounding factors currently clouding interpretation of the literature while acknowledging the limitation of sample size. Future work involving large sample sizes will be key in this pursuit. Multidisciplinary longitudinal initiatives would be the most comprehensive strategies toward this end. Prenatally tracking mothers known to be at-risk and following them and their children through the children's child bearing years would make it possible to examine not only factors conferring vulnerability and resiliency to early stress, but also the chronicity of events leading to psychopathology and HPA axis dysregulation. It is the hope that identification of markers of both risk and resiliency makes it possible to create and imple-

ment successful early intervention and prevention programs. In cases where early intervention is required, the complexity of the interactions between mother and child on multiple (ie. Biological, interactional, environmental) levels must be appreciated. That maternal functioning was found to be related to aspects of neuroendocrine function, maternal warmth and sensitivity, and perception of the infant suggests that intervention may be possible at the level of the mother, for example, by targeting improvement in self-esteem and the building of social support networks. Further, teaching skills through parenting classes to increase the quality of maternal care may impact mother-infant interactions and, in turn, development of the infants' stress reactivity system.

An important goal in future research is to identify early markers within the mother-infant dyad which are indicative of increased risk for later problematic outcome. Through this identification, early intervention may be implemented in an attempt to buffer the effects of early stress on later outcome.

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