Chapter 4
Associations Among Mother–Child Contact, Parenting Stress, and Mother and Child Adjustment Related to Incarceration

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4.1 Introduction

The number of incarcerated women has increased dramatically in recent years, doubling between 1991 and 2008 (Glaze & Maruschak, 2008; West & Sabol, 2008). The majority of women in prison are mothers of dependent children. The percentages are highest for women aged 25–34 years, with about 80 % in state prison and 75 % in federal prison having children under the age of 18 years. Advocates have

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estimated that up to ten million children (1 in 8 children in the U.S.) have experienced parental incarceration at some point in their lives (San Francisco Partnership for Incarcerated Parents, 2003a). A growing body of literature suggests that the children of incarcerated parents are more emotionally and behaviorally vulnerable than their peers (Eddy & Poehlmann, 2010; Poehlmann & Eddy, 2013). In a recent meta-analysis, experiencing parental incarceration was related to children's increased risk for the display of antisocial behavior in particular (Murray, Farrington, & Sekol, 2012).

For the children of incarcerated mothers, there are many possible reasons for increased vulnerability and risk. Prior to incarceration, mothers may have faced substantial challenges to creating home environments that are optimal for their children's development. These challenges are often rooted in a lifetime of disadvantage and related stress exposure, including growing up in poverty and in a single-parent household, dropping out of school, experiencing physical or sexual abuse, having at least one immediate family member who was incarcerated, having a parent who abused alcohol or drugs, and becoming a parent at an early age relative to other women (Greenfield & Snell, 2000). As adults, substance use dependence, posttraumatic stress, and depression—all conditions with a higher lifetime prevalence among incarcerated than non-incarcerated women (Travis & Waul, 2003)—can further challenge effective parenting and increase risk for their children's development of problem behaviors particularly when compounded by present-day poverty, residential instability, and limited vocational training and work opportunities (Kjellstrand, Cearley, Eddy, Foney, & Martinez, 2012; Kjellstrand & Eddy, 2011a, 2011b). Given this potential pile-up of adversity, incarceration can be construed as a continuation or exacerbation of stressful life experiences for mothers and for their children and families.

In addition to the risks posed by pre-existing adversity in many families, maternal incarceration often means the addition of at least one other risk, a disruption in caretaking. The transitional period following release may be challenging for both mother and child due to minimal contact and related disruptions in the relationship (Poehlmann, 2005) and mothers' experiences of prisonization that can challenge mothers' resumption of their parenting role. In a national study, over 64 % of children of incarcerated parents lived with their mother before arrest or just prior to incarceration, and 52 % had a mother who was the primary financial supporter for the family (Glaze & Maruschak, 2008). While mothers are incarcerated, most children (over 75 % in the same study) live with a non-parental relative or friend, usually a grandparent. Only 37 % live with the other parent, and a significant portion of those children also live with another caretaker as well. Given that many children lived with their mothers before prison, it is not surprising that the vast majority of mothers (85 %) had some contact with their children while incarcerated with over half (56 %) having contact at least weekly.

Contact between imprisoned adults, their children, and other family members has long been an area of interest to researchers, practitioners, and corrections administrators. Most notably, an oft cited study of prison administrative records found that frequent visits did not improve the behavior of men while incarcerated,

but were related to better parole plans, better chances of being paroled, and doing better after release while on parole (Holt & Miller, 1972). For inmates with no visitors and no correspondence, 12 % had "serious" difficulties during their first year on parole versus only 2 % who had three or more visitors. Further, while 50 % of inmates with no visitors had no parole difficulties, approximately 70 % of those with three or more visitors had no difficulties. Holt and Miller put special emphasis in their conclusions on the value of family visits during prison. More recent studies using much larger samples and including both men and women inmates have found similar positive associations between the number of visits inmates have, including those with various family members, and post-release outcomes such as recidivism (e.g., Bales & Mears, 2008; Minnesota Department of Corrections, 2011). Whether these findings are related to contact or are due to pre-existing differences prior to incarceration is unclear.

As many mothers are caregivers to their children both prior to and following incarceration (Hagan & Coleman, 2001), the impact of mother-child contact is of particular interest. Such contact may occur through visits, phone calls, or letters. Poehlmann, Dallaire, Loper, and Shear (2010) identified 36 studies conducted after 1998 on incarcerated parent–child contact; of these, nine studies reported on incarcerated maternal outcomes (seven studies found positive and two studies found negative maternal effects) and nine studies reported on child outcomes (four studies found positive, two studies found negative, and three studies found both positive and negative effects). The most common positive outcome examined for incarcerated mothers was improved parent adjustment, such as less maternal "distress," fewer depressive symptoms, more empathy, and less parenting "stress". No negative impacts of contact on these types of parent adjustment were reported. Positive outcomes for children associated with more contact included more secure attachment (among infants), less child depression and somatic complaints, fewer child school drop outs and suspensions, and fewer feelings of alienation from the incarcerated parent. Negative outcomes for children associated with more contact included insecure attachment and behavioral problems. Interestingly, only two studies examined the impact of mother-child contact on recidivism: one found positive effects (Carlson, 1998) and the other negative effects (Bales & Mears, 2008).

The focus on parental stress in the literature on inmate family contact builds on the broader literature on the impact of imprisonment on the mental health of prisoners and the direct consequences of such on their family members (Travis & Waul, 2003). This work points to the ways in which requisite coping strategies developed in response to stressors that are specific to prisons and prison culture can result in hypervigilance, interpersonal distrust and suspicion, emotional overcontrol, alienation, psychological distancing, social withdrawal and isolation, the incorporation of exploitative norms of prisoner culture, and a diminished sense of self-worth and personal value (Haney, 2003). Inmates with prior histories of trauma may be particularly vulnerable to posttraumatic stress reactions to imprisonment (Herman, 1992; Masten & Garmezy, 1985).

Exposure to prison life may significantly transform the individual. This is especially true of individuals who enter prison at an early age (Haney, 2003).

Coping responses learned while in prison may interfere with an incarcerated mother's transition to her home, impede her successful reintegration into community and work settings, and challenge her ability to resume her role with family and children. Former inmates' experiences of the unique set of psychological adaptations that typically occur in response to the extraordinary demands of prison life (Peat & Winfree, 1992) may not only alter habits of thinking, feeling, and acting, but may also influence their physiology and stress responsivity (Sapolsky, 2004), with unknown consequences for that individual's reintegration experience into the community.

In recent years, investigations of stress, or the psychological and physical reactions of individuals to environmental stressors, have been undertaken to better understand the links between exposure to specific conditions and various individual and family outcomes (Gibbons, Gerrard, Cleveland, Wills, & Brody, 2004). Many researchers are also examining stress-related coping, as exposure to stressors have been shown to influence health by directly causing physiological changes, and indirectly by increasing the likelihood of risky and unhealthy coping behaviors such as drug use (Gibbons et al., 2010). Recent studies have illuminated pathways between persistent exposure to stressors and physiological responses, such as dysregulated cortisol production, that can prime the body to be more physically reactive in potentially stressful social situations, thus reducing the capacity of an individual to remain attentive, think clearly, and learn (Gunnar & Donzella, 2002; Gunnar & Vazquez, 2001). Heightened stress reactivity can create vulnerability for poor adjustment, including depression and anxiety, social and emotional problems, and learning difficulties. These challenges can be compounded for parents and children when parents engage in unhealthy coping behaviors, including smoking, alcohol, and drug use and abuse, overeating, social isolation, and reduced help-seeking (Gibbons et al., 2010; Williams & Mohammed, 2009). Hence, stressors can challenge parent adjustment, diminish effective parenting practices, and thereby threaten healthy child adjustment.

Despite the potential relations between stress and the adjustment of incarcerated parents and their children, few studies involving incarcerated populations have conducted in depth examinations of inmate stress. Notably, all of the studies included in the Poehlmann et al. (2010) review included self-report measures of stress. As an initial step towards broadening the knowledge base on stress and incarcerated mothers, in the study reported here, we integrated the neurophysiological stress marker cortisol into a battery of self-report measures of maternal psychosocial functioning. In doing so, our hope was to gain deeper insights into the relations among maternal stress and mental health and children's adjustment.

Cortisol is the primary glucocorticoid hormone in humans, and the product of activity of the hypothalamic-pituitary-adrenal (HPA) axis that regulates the body's stress response, mobilizing energy stores and modulating the functioning of the immune system (Hellhammer, Wüst, & Kudielka, 2009; Sapolsky, Romero, & Munck, 2000). Cortisol typically has a strong diurnal rhythm, with highest levels in the early morning and lowest levels in the late evening. Over time, everyday

negative experiences can contribute to atypical cortisol fluctuation with either high or blunted cortisol levels in the morning and flatter diurnal curves over the day; downstream effects can include the development and/or progression of major depression, obesity, Type 2 diabetes, and cardiovascular disease (McEwen & Wingfield, 2003; Rosmond, 2001). Though cortisol is most commonly assayed using saliva or urine, we were unable to collect these types of samples and transport them out of the prison setting, but we were allowed to collect samples of hair. Hair analysis has been used for decades to monitor exposure to drugs and other exogenous compounds. In recent years, researchers have grown increasingly interested in quantifying endogenously produced compounds through hair (Russell, Koren, Rieder, & Van Uum, 2012). According to Russell et al. (2012) of research involving cortisol in hair, findings from clinical and community studies support its reliability as an objective biomarker of stress, including psychosocial stress. Higher hair cortisol concentrations have been reported in pregnant women with higher scores on the Perceived Stress Scale (Kalra, Einarson, Karskov, Van Uum, & Koren, 2007), patients with chronic pain compared with patients without pain (Van Uum et al., 2008), individuals who are unemployed compared with employed subjects (Dettenborn, Tietze, Bruckner, & Kirschbaum, 2010), neonates in intensive care compared with babies born at term (Yamada et al., 2007), and in individuals three months prior to being diagnosed with acute myocardial infarction (Pereg et al., 2010). The relationship between hair cortisol and high stress exposure is not always a positive one, however. For example, patients with generalized anxiety disorder have been shown to have higher perceived stress scores and lower cortisol than controls, providing evidence of hypocortisolemia, or the downregulation of the HPA axis (Steudte et al., 2011), a physiological attempt to calm an overactive system and maintain homeostasis. As posttraumatic stress disorder is more common among incarcerated women, findings such as these indicate that study participants' lifetime exposure to stressors might translate into cortisol values that are either substantially lower or higher than those of other community samples.

4.1.1 Research Questions

In the present report, we examine associations between mother-child contact, self-report and biological measures of maternal stress and adjustment, and caregiver report of child adjustment during and after maternal imprisonment. Past work in the area of incarceration related to parent and child functioning has been hampered by limited measurement strategies and lack of replication. Here, we examine three sets of research questions:

1. How do average levels of mothers' cortisol change over time, both while in prison and after release from prison? Do average levels of parenting stress and maternal adjustment (i.e., emotion dysregulation and depressive and other mental health symptoms) change in similar ways to mothers' cortisol across time?

2. What are the relations among mothers' cortisol, parenting stress, and maternal adjustment, and between maternal adjustment and children's adjustment (i.e., emotion regulation ability, internalizing and externalizing symptoms, and social skills)?
3. What are the relations between mother-child contact during and after a prison sentence and (a) mothers' cortisol, parenting stress, adjustment, and recidivism, and (b) children's adjustment?

4.2 Methods

4.2.1 Study Overview

The current investigation was conducted as an exploratory study within a larger intervention development study (*Emotions*: *Taking care of yourself when you and your child return home* [*Project Home*]; Shortt, Eddy, Sheeber, & Davis, 2014). Funded by the National Institutes of Health, Project Home was designed to provide incarcerated mothers with tools to effectively regulate their own emotions and to parent in ways that encourage their children's effective emotion regulation. By strengthening parenting and emotional skills through participation in the *Emotions Program*, Project Home aimed to help incarcerated parents and families to reduce stress associated with incarceration and transition from prison. The project extended work begun in a randomized controlled trial of the *Parenting Inside Out* parent management training program for incarcerated mothers and fathers (Eddy, Martinez, & Burraston, 2013). Project Home involved 47 mothers (at baseline) incarcerated at the only women's state correctional facility in Oregon, with assignment of participants to either an intervention (i.e., the *Emotions Program*) or control condition. Mothers in both conditions were assessed at baseline, prior to the *Emotions Program* (T1); after the *Emotions Program*, while still in prison (T2); and at 6 months, after release back to the community (T3) (Shortt et al., 2014). Primary caregivers were assessed regarding children's adjustment at T1 and T3. The study was approved by the Oregon Social Learning Center's (OSLC) Institutional Review Board (IRB), the Oregon Department of Corrections Research Committee, and the U.S. Department of Health and Human Services, Office for Human Research Protections. The OSLC IRB monitored the progress of the study.

4.2.2 Participants

As has been reported elsewhere (Shortt et al., 2014), participants were 47 mothers aged 32.8 years old on average (SD=6.9). Thirty of the children's caregivers also participated in the study. One-third of mothers (32 %) identified as racial or ethnic minority (more than one race 15 %, Latina 11 %, American Indian 4 %, and African American 2 %). Mothers' average prison sentence was 3.6 years (range 1–9 years),

and crimes included assault, burglary, delivery of methamphetamine, and manslaughter, among others. While mothers were incarcerated, their children lived with caregivers an average of 108 miles from the prison (range 11–972 miles). The children ($n=30$) were on average 7.3 years old ($SD=2.7$) and the majority were boys (62 %). Forty-two percent of children were identified as ethnic or racial minorities. Nearly all women (96 %) were the biological mothers of their children, most had lived with their children before incarceration (74 %, full or part time), and a majority had had contact with their children in the month before the study began (53 %). The majority of mothers (87 %) were single or never married, separated or divorced, or widowed before incarceration; did not complete high school (60 %); were unemployed (51 %); had been arrested five or more times as adults (63 %); and had juvenile detainment records (53 %). After release from prison, less than half (42 %) of mothers returned to live with their children (full or part time), though most (82 %) were in contact with their children in the past month. During the 6 month period of post-prison observation, 68 % of mothers were unemployed, and 21 % were detained at some point.

4.2.3 Recruitment and Retention

Prerequisites for participation included being within 6 months of release from prison and the prior completion of the group-based *Parenting Inside Out* parent management training program (2013, Eddy et al., 2008; Schiffmann, Eddy, Martinez, Leve, & Newton, 2008). If individuals were convicted of crimes against children or any type of sex offense, they were not eligible for *Parenting Inside Out*, and hence were not eligible for this study. Participating mothers were recruited using standard procedures that are used in the prison system to inform inmates about intervention programs, educational classes, and research projects (e.g., through prison newspapers, announcements in public gatherings, bulletin-board postings). Once a mother signaled her potential interest in participation, project staff met with her to provide an overview of the project and to answer any questions. Informed consent was obtained at this time. Mothers who consented to participate in the project also signed a release form giving study staff permission to contact their child's caregiver. Of eligible mothers, 87 % were recruited to participate; the recruitment rate of caregivers was 64 %. As for participant retention over the study, at T2, 100 % of mothers completed an assessment. By T3, 6 months after release, the retention rate was 81 % for mothers and 83 % for caregivers.

4.2.4 Procedures

Project Home involved a quasi-experimental design in which mothers were assigned to either the *Emotions Program* group ($n=29$) or to the comparison group ($n=18$), whose members did not receive additional parenting services beyond the Parenting Inside Out training that occurred prior to this study. Three waves of assessment

were conducted with mothers including at baseline prior to the *Emotions Program* (T1), after the *Emotions Program* while mothers were still in prison before release (T2), and 6 months after release back to the community (T3). Caregiver reports on the children were obtained at T1 and T3. Assessments for mothers comprised administering a battery of questions (see Section 4.2.5) via an in-person interview as well as collecting a hair sample and measuring participants' height, weight, waist circumference, and blood pressure. In prison, the interview and hair sample collection were conducted in a private room. Out of prison, interviews were conducted in a private setting, most commonly in the homes of participants. Mothers were compensated $25 for completing the T1 assessment in prison, $25 for completing the T2 assessment in prison before release, and $50 for completing the T3 assessment after release. No additional compensation was provided to participants involved in the intervention. Interviews with caregivers also were conducted in a private setting, most often the caregivers' homes. Caregivers were compensated $50 at T1 and $50 at T3 for completing reports on the children.

Hair sample collection and cortisol analysis. Hair samples were collected from participants following the protocol designed by Van Uum and colleagues (see Russell et al., 2012). According to this protocol, a sample of hair was cut as close to the scalp as possible at the base of the vertex posterior of the head. As the preservation of cortisol in hair does not require special storage prior to analysis, each hair sample was affixed to sample paper and stored in an envelope in a secure area only accessible to project staff until it was mailed to the Van Uum lab. According to Russell et al., 2012, hair grows an average of 1 cm per month with the most proximal 1 cm segment to the scalp reflecting the last month's cortisol patterns. The analysis of cortisol in hair requires 10–15 mg of hair per section being measured, and hair cortisol analysis was performed according to procedures described elsewhere (Russell et al., 2012). We obtained 40 hair samples at T1, 36 samples at T2[1], and 25 samples at T3; two T3 samples were not analyzed because they did not contain enough hair.

Additional considerations regarding the collection and analysis of hair samples from incarcerated women. It took several months for the Oregon Department of Corrections to approve the study's request to collect biological measures. This permission, however, did not allow study assessors to bring scissors into the facility. Instead, assessors checked out prison scissors at each visit; these small child size craft scissors had short, rounded, and dull blades, and were used for art and craft projects. Though serviceable, these scissors were not ideal for the delicate and quick collection of hair close to the scalp. The collection of hair is among the least invasive ways to collect biological material for the analysis of cortisol (Russell et al., 2012). Nevertheless, hair took on special significance for many women in prison with implications for hair collection procedures.

[1] Unique to the analysis of cortisol in hair, specific sections of the same hair sample can be assayed to obtain cortisol levels during different periods of time. In this manner, T2 cortisol levels were obtained for a few participants that did not provide a hair sample at T2 using their hair sample provided at T3.

At T1, 81 % of participants initially signed informed consent forms agreeing to our collection of a hair sample. When the assessor began to collect hair from the first two participants, however, their clear discomfort with the process led to the addition of several steps involving the clear description of each next step in the procedure and ongoing requests for permission to proceed. Among reasons participants provided for their refusal included fear that we would analyze DNA (despite assessor assurances that we would not), being Native American for whom hair is sacred, and concern about having a bald spot that would not grow in, or that would grow just enough by the time of reunification with family members to appear "spiky." Several women requested that the sample to be cut be made smaller; assessors responded to these requests while also attempting to collect a quantity that still met minimum requirements for analysis (10–15 mg of hair 1 cm in length). Upon reflection, it became clear that, for many incarcerated women, their hair was one of the few personal possessions they were allowed to keep, rendering many women highly protective of and strongly identified with their hair. This appeared especially true for women who had served sentences of many years. Some of the mothers had not cut their hair in several years and their hair was extremely long. Despite the small diameter of the sample (thickness of a dime or 1.35 mm), for women with long hair the length of the hair made the slender sample look like a large quantity.

4.2.5 Psychosocial Measures

The interview focused on key constructs including mothers' parenting stress and adjustment, including emotion dysregulation and mental health, as well as demographics. Mothers also were asked about contact with their child, including whether they lived with their child prior to incarceration and after release, and the type(s) and frequency of contact with their child while in prison and after release. Mothers also were asked questions regarding events related to criminal behavior, such as how long they had been incarcerated and whether they had been detained post-release. Caregivers were asked about children's adjustment such as their abilities to regulate emotions, internalizing and externalizing symptoms, and social skills. The interview included questions from several standardized questionnaires that have been used in prior studies.

Mothers' parenting stress. Mothers' parenting stress (reverse of parenting satisfaction and efficacy) was measured via the 10-item *Being a Parent* scale, which was originally adapted for the FastTrack project (McMahon & Lengua, 1996; example item "Being a parent makes you tense and anxious"). High scores indicated high levels of parenting stress. Across T1 to T3, Cronbach alphas varied from 0.77 to 0.78.

Mothers' adjustment. Maternal emotion dysregulation was measured using the 36-item *Difficulties in Emotion Regulation Scale* (Gratz & Roemer, 2004; example item: "When I'm upset, it takes me a long time to feel better"). Across T1 to T3, the Cronbach alphas

ranged from 0.94 to 0.95. Mothers' depressive symptoms were assessed using the 20-item *Center for Epidemiologic Studies Depression Scale* (Radloff, 1977; example item: "I could not 'get going'"), with Cronbach's alphas ranging from .86 to .93 across all waves. Mothers' general mental health symptoms (i.e., somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism) were appraised with the 52-item *Brief Symptom Inventory* (Derogatis & Melisaratos, 1983; example item: "Feeling fearful"), with Cronbach's alphas across T1 and T3 varying from 0.94 to 0.96.

Children's adjustment. Caregivers reported children's emotion regulation ability using the 24-item Checklist for Child's Emotion Regulation (Shields & Cicchetti, 1997; example item: "Gets over it quickly when he/she is upset or unhappy"), children's internalizing and externalizing symptoms using the broadband scales of the Child Behavior Checklist (Achenbach & Rescorla, 2001; example item: "Cruelty, bullying, or meanness to others"), and children's social skills using the 33-item Peer Involvement and Social Skills Questionnaire (Walker & McConnell, 1995; example item: "Makes friends easily with other children"). Internalizing problems was the sum of the withdrawn/depressed, anxious/depressed, and somatic complaint scales (32 items) and externalizing problems was the sum of the rule-breaking and aggressive behavior scales (35 items). Cronbach's alpha was 0.87 at T1 and T3 for emotion regulation ability, 0.83–0.92 for internalizing and externalizing symptoms across T1 and T3, and 0.96 at T1 and 0.97 at T3 for social skills.

4.2.6 Analytic Approach

Preliminary analyses were conducted to examine intervention group effects in hair cortisol using repeated-measures analysis of variance (ANOVA) with a within factor of time (T1 vs. T2 or T2 vs. T3) and a between factor of group (intervention vs. comparison). These analyses indicated that there were no significant group differences, $F(1, 31) = 0.47$, $p = 0.50$ for T1 versus T2 and $F(1, 22) = 1.08$, $p = 0.31$ for T2 versus T3 and no significant group by time interactions, $F(1, 31) = 2.54$, $p = 0.12$ and $F(1, 22) = 1.62$, $p = 0.22$. As a result, subsequent analyses were conducted across intervention and comparison groups.

Mean level differences over time on hair cortisol, parenting stress, emotion dysregulation, and depressive and mental health symptoms were examined using repeated-measures ANOVAs with a within factor of time (in prison comparison T1 vs. T2 or after release comparison T2 vs. T3). Stability over time (in prison: T1 to T2; in prison to after release: T2 to T3) was examined using correlations (one-tail). Associations between mother hair cortisol, mother parenting stress, mother adjustment (i.e., emotion dysregulation and depressive and mental health symptoms), child adjustment (i.e., emotion regulation ability, internalizing and externalizing symptoms, and social skills) and mother-child contact were examined at T1, T2, and T3 using correlations (one-tail) and chi-square analysis.

All cortisol values were recoded to drop values higher than 1,500, indicative of possible contamination, most commonly by hydrocortisone use. Two samples from T1 ($n = 40 - 2 = 38$) and T2 ($n = 36 - 2 = 34$) were dropped because of possible contamination, and no samples were dropped from T3 ($n = 25$). Recoded cortisol variables were further examined and as two T1 and one T3 samples were outliers (>2*SD* above mean), we recoded them to the next highest value.

4.3 Results

4.3.1 Change Across Time

Hair cortisol. Average levels of mother hair cortisol were compared in prison (T1 vs. T2) and after release (T2 vs. T3; see Table 4.1 for means and standard deviations). Mother hair cortisol did not change when comparing two samples both obtained during stay in prison. However, hair cortisol levels significantly increased from T2 (before release) to T3 (after release), $F(1, 23) = 8.76$, $p < 0.01$.

Parenting stress, *emotion dysregulation*, *and depressive and mental health symptoms*. To determine if other aspects changed in similar ways over time to mother hair cortisol, in prison comparisons (T1 vs. T2) and after release comparisons (T2 vs. T3; see Table 4.1 for means and standard deviations) were conducted for other variables. Mother emotion dysregulation significant decreased from T1 (in prison) to T2 (before release), $F(1, 46) = 6.93$, $p < 0.05$, and decreased from T2 (before release) to T3 (after release) at the $p < 0.10$ level, $F(1, 37) = 2.79$, $p < 0.10$. Mother depressive symptoms significantly decreased from T1 to T2, $F(1, 46) = 5.24$, $p < 0.05$, but not

Table 4.1 Means and standard deviations for pairwise comparisons over time

	In prison comparison		Before versus after release comparison	
	T1 vs. T2		T2 vs. T3	
Variable	$N = 47$		$n = 38$	
Mother hair cortisol (ng/g)	225.98	231.79	237.59_a	327.58_b
	(113.33)	(110.13)	(110.42)	(163.16)
Mother parenting stress	3.00	2.96	3.02	3.20
	(.93)	(.96)	(1.0)	(.96)
Mother emotion dysregulation	72.94_a	66.77_b	67.18	63.13
	(21.37)	(18.69)	(19.51)	(20.08)
Mother depressive symptoms	17.55_a	13.96_b	12.66	11.55
	(10.76)	(8.97)	(7.93)	(11.27)
Mother mental health symptoms	$.71_a$	$.56_b$	.54	.56
	(.52)	(.45)	(.44)	(.57)

Note: For hair cortisol, $n = 33$ for the T1 vs. T2 comparison and $n = 24$ for the T2 vs. T3 comparison. Means with different subscripts indicate significant time effects at $p < .05$

from T2 to T3. Similarly, mother mental health symptoms also significantly decreased from T1 to T2, $F(1, 46) = 5.22$, $p < 0.05$, but not from T2 to T3. For mother parenting stress, there were no significant differences between T1 and T2 or between T2 and T3.

4.3.2 Stability Across Time

Hair cortisol. T1 mother hair cortisol levels in prison were related to T2 hair cortisol levels before release, $r(33) = 0.37$, $p < 0.05$, and T2 hair cortisol levels before release were related to T3 hair cortisol levels after release, $r(24) = 0.46$, $p < 0.05$.

Parenting stress, *emotion dysregulation*, *and depressive and mental health symptoms*. To determine the stability of other aspects over time in regards to mother hair cortisol, associations in prison (T1 with T2) and after release (T2 with T3) were examined for other variables. T1 mother parenting stress in prison was significantly related to T2 parenting stress before release, $r(47) = 0.73$, $p < 0.001$, and T2 parenting stress before release was significantly related to T3 parenting stress after release, $r(38) = 0.62$, $p < 0.001$. T1 mother emotion dysregulation in prison was significantly related to T2 emotion dysregulation before release, $r(47) = 0.69$, $p < 0.001$, and T2 emotion dysregulation before release was significantly related to T3 emotion dysregulation after release, $r(38) = 0.72$, $p < 0.001$. T1 mother depressive and mental health symptoms in prison were significantly related to T2 symptoms before release, $r(47) = 0.42$, $p < 0.01$ and $r(47) = 0.57$, $p < 0.001$, respectively, and T2 symptoms before release were significantly related to T3 symptoms after release, $r(38) = 0.51$, $p < 0.001$ and $r(38) = 0.36$, $p < 0.05$, respectively.

4.3.3 Associations Among Key Constructs

Correlations were conducted to determine associations with mother hair cortisol, mother parenting stress and adjustment (emotion dysregulation, and depressive and mental health symptoms), and children's adjustment (social skills, emotional dysregulation, and internalizing and externalizing symptoms) at each time point. As detailed in the correlation matrix in Table 4.2, mother parenting stress was significantly associated with mother hair cortisol at T1 and T2, and showed a trend association at the $p < 0.10$ level at T3. Mother emotion dysregulation was significantly associated with mother hair cortisol at T1 and associated at the $p < 0.10$ level at T2 and T3. Higher levels of mother parenting stress and mother emotion dysregulation were related to higher levels of hair cortisol. Mother depressive and mental health symptoms were not significantly associated with mother hair cortisol at T1, T2, or T3. Mother emotion dysregulation and mother depressive and mental health symptoms were significantly associated with each other at T1, T2, and T3. Mother parenting stress was also significantly associated with emotion dysregulation at T1, T2,

Table 4.2 Correlations among mother hair cortisol, parenting stress, and adjustment

	Hair cortisol (ng/g)	Parenting stress	Emotion dysregulation	Depressive symptoms	Mental health symptoms
Hair cortisol (ng/g)	–	.40**/.32*	.29*/.23^{+}	.07/–.07	–.05/–.04
Parenting stress	.31^{+}	–	.60***/.58***	.47***/.40**	.33*/.26*
Emotion dysregulation	.29^{+}	.48***	–	.68***/.58***	.46***/.52***
Depressive symptoms	.14	.25+	.71***	–	.82***/.84***
Mental health symptoms	.02	.12	.56**	.89***	–

Note: ***$p<.001$; **$p<.01$; *$p<.05$; $^{+}p<.10$. T1/T2 correlations are above the diagonal, respectively ($N=47$; for T1 hair cortisol, $n=38$, and for T2 hair cortisol, $n=33$). T3 correlations are below the diagonal ($n=38$; for T3 hair cortisol, $n=25$)

Table 4.3 Mother hair cortisol, parenting stress, and adjustment with child adjustment correlations

	Mother hair cortisol (ng/g)	Mother parenting stress	Mother emotion dysregulation	Mother depressive symptoms	Mother mental health symptoms
	T1/T3	T1/T3	T1/T3	T1/T3	T1/T3
Child emotion regulation ability	–.15/–.59**	–.45**/–.50**	–.48**/–.12	–.30*/.04	–.17/.04
Child internalizing	.23/.26	.18/.42*	.52**/.51**	.30*/.26	.18/.24
Child externalizing	.05/41^{+}	.34*/.30^{+}	.32*/.07	.21/–.05	–.03/–.12
Child social skills	–.09/–.32	–.49**/–.32^{+}	–.43**/–.18	–.16/.02	–.07/–.01

Note: ***$p<.001$; **$p<.01$; *$p<.05$; $^{+}p<.10$. At T1, $n=30$; for T1 hair cortisol, $n=24$. At T3, $n=23$; for T3 hair cortisol, $n=15$

and T3, depressive and mental health symptoms at T1 and T2, and associated with depressive symptoms at the $p<0.10$ level at T3.

As shown in the correlation matrix in Table 4.3, at T1, mother parenting stress was significantly related to child difficulty regulating emotions, externalizing symptoms, and poor social skills. Mothers' emotion dysregulation was significantly related to child difficulty regulating emotions, internalizing and externalizing symptoms, and poor social skills. Mothers' depressive symptoms were significantly related to child difficulty regulating emotions and internalizing symptoms. At T3, mothers' higher hair cortisol was significantly related to child

difficulty regulating emotions. Similar to T1, at T3, higher mother parenting stress was significantly related to child difficulty regulating emotions and internalizing symptoms and related to child externalizing and poor social skills at the $p < 0.10$ level. Also at T3, mothers' greater emotion dysregulation was significantly related to child internalizing symptoms.

4.3.4 Associations with Mother–Child Contact

Correlations between mother-child contact (living with child full or part time before incarceration, frequency of in-person or telephone contact in past month or after release, length of time since last in-person visit, telephone call, or contact by letter, living with child full or part time after release) and mother hair cortisol, parenting stress, adjustment, and child adjustment were examined at each time point. In addition, correlations with time incarcerated were examined at each time point and correlations with recidivism as indicated by being detained in the 6 months after release. As detailed in the correlation matrix in Table 4.4, living with their child before incarceration was significantly associated with lower levels of hair cortisol at T1 in prison and living with their child after release was associated at the $p < 0.10$ level with lower levels of hair cortisol at T3. Follow up ANOVAs to examine mean level differences revealed that mothers who lived with their child before incarceration had significantly lower levels of hair cortisol at T1 in prison ($M = 193.20$, $SD = 90.32$) compared to mothers who did not live with their child ($M = 323.52$, $SD = 134.72$), $F(1, 37) = 11.24$, $p < 0.01$ (but not at T2 before release or T3 after release). However, mothers who lived with their child after incarceration did not have significantly lower levels of hair cortisol at T3 after release ($M = 273.22$, $SD = 157.59$) compared to mothers who did not live with their child ($M = 358.85$, $SD = 162.53$), $F(1, 24) = 1.76$, $p = 0.20$.

Longer length of time since last contact was significantly associated with higher levels of hair cortisol at T1 in prison only. Time incarcerated was associated at the $p < 0.10$ level with hair cortisol at T3 after release (see Table 4.4). The longer women were in prison, the higher their post-release cortisol levels. Longer time incarcerated was also significantly associated with higher levels of mother mental health symptoms at T1 in prison and T2 before release but not at T3 after release. Frequency of contact in past month was not related to hair cortisol at T1 in prison or T2 before release, and frequency of contact since release was not related to hair cortisol at T3 after release.

In regards to children (see Table 4.4), none of the child adjustment variables significantly related to whether mothers lived with their children before or after release. There was a significant association between frequency of contact between mothers and children and children's internalizing symptoms at T1. The more frequent the contact between mothers and children, the greater children's internalizing symptoms at T1. Mothers' time incarcerated was significantly related to children's emotion regulation difficulties and poor social skills at T1 and T3 and children's

Table 4.4 Correlations with mother-child contact

	Lived with child before incarceration (1 = yes, 0 = no)			Frequency of contact (in-person or phone) in last month or since release			Length of time since last contact (in-person, phone, or letter)			Time incarcerated			Lived with child after release (1 = yes, 0 = no)
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T3
Mothers													
Hair cortisol (ng/g)	−.49***	−.15	−.15	−.14	.21	−.04	.30*	.15	.12	.01	−.12	.32^{+}	−.27^{+}
Parenting stress	−.10	.03	.07	.05	.11	.26^{+}	−.06	.06	−.49***	.27*	.16	.25^{+}	.06
Emotion dysregulation	−.09	.05	.12	.02	.11	.02	.02	−.16	−.07	.10	−.02	−.06	−.13
Depressive symptoms	.09	.02	−.07	−.09	.04	−.14	.01	−.13	.05	.15	.20^{+}	−.19	−.09
Mental health symptoms	.11	.00	−.18	−.01	.05	−.22	.12	−.04	.13	.24*	.39**	−.13	−.16
Detention (1 = yes, 0 = no)			−.42**			−.38**			.04			−.29*	−.44**
Children													
Emotion regulation ability	.02			−.28^{+}		−.15	.12		.14	−.39*		−.47**	.01
Internalizing	.05			.38*		.29^{+}	−.28^{+}		−.25	.001		.31^{+}	.19
Externalizing	.08			.08		.14	−.03		−.10	.04		.50**	−.02
Social skills	−.07			−.21		−.12	.13		.11	−.49**		−.40*	.13

Note: ***$p < .001$; **$p < .01$; *$p < .05$; $^{+}p < .10$. For mothers: $N = 47$ at T1 and T2 and $n = 38$ at T3. For children: $N = 30$ at T1 and $n = 23$ at T3. For hair cortisol, $n = 38$ at T1, $n = 33$ at T2, and $n = 25$ at T3

externalizing at T3. The longer mothers were incarcerated, the lower children's abilities to regulate their emotions and social skills were at both T1 and T3 and the greater children's externalizing symptoms at T3.

Associations between recidivism and mother-child contact indicated that mother' living with child before incarceration, more frequent contact while in prison, and living with child after release were significantly associated with less recidivism (see Table 4.4). Lower recidivism also was related to longer incarceration times. Follow up ANOVAs to examine mean level differences indicated that mothers who were detained in the 6 months after release had significantly less contact with their child ($M = 2.00$, $SD = 2.00$) compared to mothers who were not detained ($M = 3.93$, $SD = 1.84$), $F(1, 37) = 6.06$, $p < 0.05$. For time incarcerated, the group difference approached significance at the $p < .10$ level. Mothers who were detained by T3 had spent less time (in months) incarcerated ($M = 22.26$, $SD = 14.03$) compared to mothers who were not detained after release ($M = 38.12$, $SD = 23.25$), $F(1, 37) = 3.35$, $p < 0.10$. Whether mothers were detained post-release was significantly associated with living with their child before incarceration, χ^2 ($n = 38$, $df = 1$) $= 6.84$, $p < 0.01$, and after release, χ^2 ($n = 38$, $df = 1$) $= 7.37$, $p < 0.01$. Of the mothers who were detained after release, 63 % did not live with their child before incarceration and 100 % did not live with their child after release. In contrast, of the mothers who were not detained after release, 83 % lived with their child before incarceration and 63 % lived with their child after release.

4.4 Discussion

The present study was intended as a first step toward illuminating pathways linking stressors, parent stress (biological and psychosocial, including that related to parenting), and parent and child adjustment during the period of time before and after incarcerated parents are released from prison. This transitional period may be critical to the future adjustment of both mother and child (Travis & Waul, 2003), and learning more about the psychological and social processes in play during this time is vital to developing effective preventive interventions that improve short and long term outcomes for mothers, children, and families. We now discuss the implications of our findings.

4.4.1 Mother–Child Contact

Findings were mixed in regards to the association between mother-child contact and indices of maternal and child adjustment. At T1 in prison, mother-child contact may have served as a maternal stress buffer, with lower cortisol levels detected among mothers who had lived with their child prior to incarceration and who, while in prison, had been in more recent contact with their child. For children, however,

more contact (as defined as frequency of visits or phone calls) with incarcerated mothers was related to higher child internalizing symptoms. In contrast, longer periods of mother incarceration, and thus more limited contact between mother and child, were related not only to children's emotion regulation difficulties and poorer social skills, but also to child externalizing behaviors. Both findings suggest the need for careful consideration of contact, and lack thereof, by parents and caregivers, service providers, and corrections and other related public systems.

In terms of the first finding, this is not the first study to find negative effects related to contact between incarcerated parents and children (see Poehlmann et al., 2010), and this finding raises questions regarding not only why some children had more internalizing symptoms related to more frequent contact and other children do not, but also what might be done to buffer this potentially problematic outcome. Particularly important issues to consider include what a child has been told about his or her mother's situation, how a child is prepared for a call or visit by his or her caregivers and his or her mother, what mothers and caregivers and prison staff do to help calls and visits go well, and how both caregiver and mother interact with the child after a call or a visit.

In terms of the second finding, as noted elsewhere in this paper and in this monograph, prison time can be stressful on all family members, including children. One of the most consistent findings in the literature is that the children of incarcerated parents are at elevated risk for exhibiting externalizing behaviors (Murray et al., 2012), and problems with emotion regulation and poor social skills could be considered be part of a constellation of more serious problems of child conduct (e.g., Oppositional Defiant Disorder, Conduct Disorder) or correlates of such problems. Externalizing behavior may be one response to this stress. However, the story may be more complicated. For example, the relation between longer sentences (and thus reduced mother-child contact) and increased externalizing problems for children may be due primarily to reverberations from the incarceration, including separation from parent, and/or due to a combination of this and problems present before the incarceration, such as exposure to parent criminality and its correlates, such as increased exposure to delinquent peers, reduced parental supervision and monitoring, and increased inept discipline. Regardless, the relation between sentence length and child problems points to the challenges of parenting a child with a mother in prison, and the need for support for the parent/caregiver who is parenting the child on the outside.

In recent years, advocates have declared a "bill of rights" for children of incarcerated parents, with the most attention paid to the "right to speak with, see and touch my parent" (San Francisco Partnership for Incarcerated Parents, 2003b). No less important in this bill is the "right to support as I struggle with my parent's incarceration". An appropriate companion to the bill would be a statement of the responsibilities of all concerned to prepare, guide, and comfort a child through the process of contact, and lack of contact, with an incarcerated parent.

In terms of research, future investigations of mother-child contact might explore how to increase the quality of various types of mother-child communication (whether face-to-face, on the phone, or via letter), such as how contexts might be changed to enhance in person visitation. Rigorous trials of parenting interventions,

including visitation interventions, for both incarcerated mothers and for parents and other caregivers in the community are very much needed to inform the field on "best" practices and policies relevant to incarcerated mothers and their families.

4.4.2 Maternal Stress and Adjustment

Maternal cortisol values remained stable while mothers were in prison, and increased significantly after release. This pattern of cortisol change following release from prison is unique in comparison with the trajectories of other key constructs over time. Mothers' self-reported parenting stress remained stable over the three time points, while mothers' emotion dysregulation showed a linear decreasing trend, and both depression and other mental health symptoms fell while mothers were still in prison and remained stable after release. Across all three waves, higher maternal cortisol related to higher levels of parenting stress and emotion dysregulation. It was somewhat surprising, given the neurochemistry of depression that closely hews to the HPA axis, that cortisol was not significantly correlated with depressive and mental health symptoms at any wave. That parenting stress and emotion dysregulation post-release did not spike in tandem with maternal cortisol suggests that mothers' high physiological stress levels may have been responsive to factors, whether stressful or not, that were not captured here, such as securing employment and housing, and negotiating relationships apart from those with children (Travis & Waul, 2003).

Of interest in terms of future research, self-report and biological measures of stress provided unique information regarding relations among mother-child contact, and mother and child outcomes. While the average cortisol levels reflecting incarcerated mothers' stress at three distinct time points before release (T1), before release but after the *Emotions Program* (T2), and within six months of release from prison (T3) appear to be high, it will be important to determine in future research whether cortisol values for incarcerated mothers are higher than values reported in prior studies of non-incarcerated populations (e.g., Thomson et al., 2010). As is already evident in numerous other studies (see Haney, 2003), incarceration can be a stressful experience. The period after release also appears to be stressful physiologically. Given these findings, incarcerated mothers, their children, and family members, may be in a position to benefit from effective stress management techniques to help them cope both with the incarceration period as well as during the transition home.

It is unclear why associations between greater mother-child contact and lower maternal stress at T1 did not hold up at T2 just prior to mothers' release. However, this period is one of a new type of stress, marked by heightened anticipation and hope. It may be that the three time points examined here present three very different psychological and environmental "settings" in which to examine the relations among these variables.

Research based on self-report measures indicates that mother and child stress can surge during reunification (Cobbina & Bender, 2012), and mothers' cortisol values at T3, the highest recorded during this study, provide additional support for this phenomenon, especially as hair cortisol levels were compared to participants' own baseline levels obtained during imprisonment. Surprisingly, at T3, maternal cortisol levels did not relate to mother-child contact in the form of living together, frequency of contact, and duration since last contact with their child. Similarly, these measures of mother-child contact did not significantly relate to children's adjustment. Instead, at T3, most indicators of child functioning were sensitive to mothers' stress, with parenting stress relating to children's difficulties regulating their emotions and to higher internalizing symptoms, and higher maternal cortisol levels post-release relating to children's poorer emotion regulation. Though mothers' emotion dysregulation at T3 was significantly associated with higher children's internalizing symptoms, this was the only finding post-release linking maternal adjustment to child adjustment. In all, the evidence pointed to the role of maternal stress as a proximal influence on children's adjustment post-release.

Given the constellation of other potential stressors that women may experience post-release (Travis & Waul, 2003), it is possible that the earlier positive influence on mothers' cortisol of closer contact with children may be overwhelmed by the acute stressors associated with readjustment to life outside prison. Stressors associated with readjustment may have been more acute for some women than for others; the finding that women with longer sentences had higher cortisol levels raises questions of whether these women experienced more intense prisonization that may have rendered them particularly vulnerable to the impact of stressors associated with community readjustment. Longer prison sentences and/or their precursors and consequences may be disabling for children, too; at T3, the children of women who served longer sentences were at greater risk of poor outcomes across every child variable measured.

Somewhat complex relations among cortisol, parenting stress, and mother-child contact emerged at T3 that may have implications for supports for incarcerated mothers post-release. While mothers were in prison (at T1 and T2), mother-child contact was unrelated to self-reported parenting stress; it was not until mothers were released that increased contact with children related to higher self-reported parenting stress. Higher parenting stress, in turn, was related to elevated cortisol. It is possible that an indirect relationship exists between mother-child contact and cortisol through changes in parenting stress, a hypothesis that would need to be tested with a larger sample. Though mother-child contact also appears to be protective as suggested by reduced recidivism rates among mothers who had more frequent contact and lived with their children before and after incarceration, engaged parenting on the outside may also serve as a unique stressor for newly released mothers—with potentially direct implications for mothers' psychosocial stress and indirect effects for physiological stress—that warrants further investigation.

The findings regarding cortisol and the potentially debilitating effects of longer sentences raise several questions of relevance to the healthy adjustment of children of incarcerated parents. As discussed above, one of the most proximal influences on healthy child adjustment is effective parenting. Effective parenting includes the consistent practice

of positive parenting skills while remaining physically and emotionally present with children, which may be deleteriously affected by depression, emotion dysregulation, and other forms of poor parent adjustment. In the present study, strengthening incarcerated mothers' adjustment has implications for mothers' being able to parent well, with clear benefits for children. Despite our identification of the highest levels of positive maternal adjustment at T3, average maternal cortisol was also at its highest point in the study. This finding suggests that stress may exert effects—unique from those related to maternal adjustment—on formerly incarcerated mothers and their children.

It remains unclear, however, which stress-related elements may place certain former inmates and, by extension, their children, at heightened risk. Are former prisoners at greater risk for difficult reunification if they have greater stress responsiveness post-release as reflected in cortisol spikes that may have remained consistently elevated, have particularly poor coping responses, and/or did individual experiences and perceptions of stressors play a role? It is possible that all of these phenomena occur simultaneously, for instance, with high cortisol potentially impairing women's capacities to exercise sound judgment, and women coping with stress in ways that are no longer adaptive (e.g., social isolation). Women's individual perceptions, often honed in response to a lifetime of adversity, may have played a role; one former incarcerated mother might perceive of a stressor as meddlesome while another might perceive of the same phenomenon as traumatic and highly stressful. Further, former incarcerated mothers may have been exposed to different stressors depending on the legacy they bring with them based on issues such as their specific crimes, the social relationships they return to, and how they are influenced by their past, and how long they were imprisoned and the impact this has on their mental functioning (Haney, 2003). Finally, in many states, women who served time for felony drug convictions are ineligible for public assistance and certain types of employment (San Francisco Partnership for Incarcerated Parents, 2003). Issues such as these may contribute to more stress for some women than for others.

4.4.3 Recidivism

The implications of mother-child contact for recidivism after prison release are emphasized by the study's findings. Mothers who lived with their child before incarceration, had more frequent contact after release, served more prison time, and lived with their child after release were less likely to get in trouble with the police and be detained in the six months after release. Given these relations, interventions with mothers and caregivers during prison designed to improve communication and begin to bring healing to often strained relationships seem of particular interest. Such work has the potential to assist mothers in rebuilding and strengthening support systems that provide much needed buffers both during prison and after release. Further, interventions designed to improve parent–child relationships and parenting skills also seem warranted. If findings identified here are replicated with larger

samples, it may be that intervention efforts focused on positive family and social bonds may have immediate and long term impacts in lowered recidivism as well as more healthy maternal and child adjustment.

4.4.4 Limitations

A key limitation to the present study is the small sample size, and related issues, such as the lack of adequate representation of various racial and ethnic groups in the sample. Clearly, this study is just a first step to examining the issues discussed here, and additional work is required with larger and more representative samples. In addition, for various reasons, including religious beliefs, assessors encountered sensitivity among incarcerated women related to the collection of hair as a biological sample, and some women opted out of this component of the study, leading to missing data. As a counter to this, staff inserted into the standard Van Uum hair protocol several additional check-ins with participants regarding their level of comfort with each step of the protocol. This approach, combined with the strong rapport developed between study assessors and many mothers over the course of this longitudinal study, led to many participants agreeing to donate a hair sample at T3. It is possible that some hair samples were influenced by hydrocortisone as some women reported receiving unlabeled prescription creams from prison health providers and not knowing what they contained. Cortisol values indicative of possible contamination were recoded prior to analysis as previously noted.

4.5 Conclusion

The present study sought to identify areas of vulnerability that might be shored up prior to release and during the post-release process of reintegration back into day-to-day life in the community. For many mothers, this means once again becoming the primary caregiver. An important candidate during this period appears to be maternal stress, which may serve as a key proximal influence on children's adjustment post-release. If this finding holds up in future studies, this result implies that one avenue for promoting positive readjustment for formerly incarcerated mothers and their children involves helping mothers to effectively reduce their psychosocial and physiological stress and related negative coping. By supporting mothers' abilities to manage stress while promoting mothers' positive parenting skills and healthy adjustment, mothers' abilities to parent effectively may be safeguarded, along with their children's overall well-being. A second, synergistic, candidate appears to be mother-child contact while mothers are incarcerated. By supporting both mothers and their children as they do, and do not have contact, stress may be reduced and well-being may be promoted. Rigorous basic and intervention research is needed on these topics so that a knowledge base is available to better guide families—and the professionals who serve them—as they struggle with the challenges of incarceration and its aftermath.

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