PARENT EMOTION SOCIALIZATION AND EMOTION REGULATION IN SUBSTANCE ABUSING FAMILIES

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ABSTRACT

Julia Madeleine Shadur: Parent Emotion Socialization and Emotion Regulation in Substance Abusing Families
(Under the direction of Andrea Hussong)

The current study examined emotion socialization behaviors among mothers in addiction treatment and explored risk mechanisms that may explain emotion regulation deficits in young children of substance-abusing mothers. Variability within the sample was explored in order to evaluate *who* is at risk (i.e., those with greater severity of drug use) and *when* they are at risk (i.e., while using) for engaging in less effective emotion socialization behaviors. On average, mothers reported engaging in "emotion coaching" styles of socialization involving more consistent and supportive reactions and fewer non-supportive reactions to children's emotions, consistent with general population studies. However, the context of drug use negatively impacted how well mothers balanced these types of reactions: mothers engaged in significantly higher levels of non-supportive and inconsistent reactions during periods of problematic drug use compared to periods of sobriety. Findings support a mediated risk mechanism such that more severe impairment related to maternal substance use predicted higher levels of non-supportive reactions to children's negative emotions which, in turn, predicted poorer child emotion regulation. Implications for prevention and treatment suggest that non-supportive emotion socialization behaviors may be an appropriate target for supporting emotion regulation within contexts of maternal drug use.

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LIST OF ABBREVIATIONS

CCNES	Coping with Children's Negative Emotions Scale
CFA	Confirmatory Factor Analysis
COSs	Children of Substance-abusing parents
EFA	Exploratory Factor Analysis
SEM	Structural Equation Modeling
SUD	Substance Use Disorder

CHAPTER 1: INTRODUCTION

Nearly 12% of children (>8.3 million) in the United States are living with at least one parent with an alcohol or illicit substance use disorder (SUD), and 3.4 million have mothers with a SUD (SAMHSA, Office of Applied Studies, 2009b). **C**hildren **o**f **S**ubstance-abusing parents (**COSs**) are at increased risk for multiple negative outcomes, including increased rates of anxiety, depression, oppositional behavior, conduct problems, aggressive behavior, and substance use, lower rates of self-esteem and social competence, and compromised emotion regulation abilities (e.g., Chassin, Rogosch, & Barrera, 1991; Eiden, Edwards, & Leonard, 2004; Hussong, Zucker, Wong, Fitzgerald, & Puttler, 2005; Martin, Earleywine, Blackson, Vanyukov, Moss, & Tarter, 1994; Roosa, Sandler, Beals, & Short, 1988; see Solis, Shadur, Burns, & Hussong, in press). Importantly, compromised emotional and behavioral functioning in COSs is evidenced as early as two- to three years of age (Hussong, Flora, Curran, Chassin, & Zucker, 2008; Hussong, Wirth, Edwards, Curran, Chassin, & Zucker, 2007). Exposure to drug use in-utero may account for part of this risk, as children who are prenatally exposed also exhibit deficits in emotion regulation, issues with attention and distractibility, impulsivity, poor peer relations, and conduct and behavior problems (Kaplan-Sanoff & Leib, 1995; also see Mayes & Truman, 2002, for a review). This concern is especially salient given that 10% of pregnant women report current use of alcohol, 4.4% report drinking five or more drinks on one occasion, and 4.5% report using illicit drugs in the past thirty days (SAMHSA, 2010).

The parenting context within substance-abusing families is one key factor contributing to increased risk for negative outcomes among COSs. Impaired parenting is one significant and

common deficit among substance-abusing parents (see Mayes & Bornstein, 1995, for a review), holding large implications for the growing population of children who are exposed to parental substance abuse. Parents who abuse substances are more likely to have compromised parenting skills (e.g., see Mayes & Truman, 2002, for a review) and to engage in child maltreatment/neglect (Street, Whitlingum, Gibson, Cairns, & Ellis, 2008). Mothers who abuse substances are generally less engaged and less responsive, exhibit less warmth and encouragement while interacting with their children (e.g., Eiden, Edwards, & Leonard, 2002; Solis, Shadur, Burns, & Hussong, in press), and many believe that holding a crying infant would spoil him/her (Velez, Jansson, Montoya, Schweitzer, Golden, & Svikis, 2004). Notably, parenting behavior has been found as a mediator of the relations between parental alcohol use and various child outcomes, including children's emotion regulation (Eiden, Edwards, & Leonard, 2007; 2004), social competence (Eiden, Colder, Edwards, & Leonard, 2009), and adolescent substance use (Chassin, Curran, Hussong, & Colder, 1996).

Substance-abusing parents and their children have been identified as important targets for intervention and prevention efforts to reduce a variety of negative outcomes, including substance use in these children. One particular interest in this population comes from a push within the field to gain insight into the mechanisms that may explain the intergenerational transmission of substance abuse and deficits in emotion regulation that are likely to occur in families with substance use involvement. It has been established that parental substance abuse is associated with children's emotion regulation (e.g., Eiden, Lewis, Croff, & Young, 2002), and the parenting context may mediate these relations in some families (Eiden, Edwards, & Leonard, 2007; 2004), but there is a need to identify additional mediators to help further elucidate *why* this relationship exists and ultimately to serve as potential treatment targets.

Children's emotion regulation is an important focus within this line of research because longitudinal work shows that emotion regulation predicts multiple indices of child adjustment later in development (e.g., internalizing and externalizing symptoms; see Eisenberg, Spinrad, & Eggum, 2010 for a review; social competence; Maszk, Eisenberg, & Guthrie, 1999; Trentacosta & Shaw, 2009). Within the context of substance-abusing families, emotion regulation has been shown to mediate relations between parental substance abuse and other notable negative outcomes over time (e.g., elevated externalizing symptoms; Eiden, Edwards, & Leonard, 2007; poor social competence; Eiden, Colder, Edwards, Leonard, 2009), indicating that the development of effective emotion regulation strategies may protect children from progressing to psychiatric symptoms and perhaps disorder. Indeed, emotion regulation plays a key role in two developmental pathways leading to substance use disorder, including an internalizing pathway (i.e., inhibited temperament early in development that predicts internalizing symptoms and compromised emotion regulation throughout adolescence, and comorbid affective and substance use disorders later in life; Hussong, Jones, Stein, Baucom, & Boeding, 2011) and an externalizing pathway (i.e., difficult temperament early in life that predicts conduct disordered behavior and compromised emotion regulation, and subsequent antisocial behavior and substance use disorder; Tarter, Vanyukov, Giancola, Dawes, Blackson, Mezzich, et al., 1999). Emotion regulation is thus an important target to prevent intergenerational transmission of substance use disorders, and gaining a deeper understanding of the mechanisms of risk that impact emotion regulation would allow more precise and effective tailoring of prevention and intervention efforts.

Defining Emotion Regulation

It has been challenging for the field to agree upon the construct of emotion regulation (Thompson, 1994; Thompson & Goodman, 2010), and the various dimensions of emotion regulation that have been recognized cover a range of indices including but not limited to emotionality, vagal tone, effortful control, impulsivity, behavioral inhibition, behavioral regulation, ability to down regulate, and the extent to which external sources of regulation are needed and are effective (e.g., Eisenberg & Fabes, 2006; Eisenberg, Smith, & Spinrad, 2011; Gottman, Katz, & Hooven, 1996). The primary source of debate in the field is whether emotion itself and the process of emotion regulation are discrete constructs; however, a thorough review of the controversy is beyond the scope of this paper and can be found elsewhere (Thompson & Goodman, 2010).

The definition of emotion regulation employed for the current study pulls from that of various scholars (Calkins & Leerkes, 2011; Eisenberg & Fabes, 2006; Eisenberg, Liew, & Pidada, 2001), stating that emotion regulation is *the actions and strategies that serve to modify, dampen, maintain, or increase emotional experience (e.g., level of anxiety) or associated behaviors (e.g., crying).* Importantly, this definition excludes the mere experience of arousal or emotionality itself. The rationale for excluding arousal itself is that *regulation* implies efforts to *control, maintain, or change* emotion, whereas arousal or emotionality conveys the *mere experience* of emotion. It is acknowledged here that it may be possible that any given level of arousal or emotionality *could* be a result of efforts to control or modify emotions (and thus may directly reflect regulation), but this is not always true (Campos, Frankel, & Camras, 2004). It is thus more conservative to maintain a view of emotion regulation that only includes indices that

clearly dictate efforts to control or modify emotional experiences, which does not include arousal or emotionality.

Emotion Regulation in Children of Substance-abusing Parents

Emotion regulation development begins at approximately the age of 2 years and continues to progress rapidly through the preschool years (Blair & Diamond, 2008). Parents are one of the greatest sources of support and socialization for children's emotional development, especially for younger children whose principal source of socialization comes from primary caregivers. Parents play a critical role in children's development of effective emotion regulation strategies (Gottman, Katz, & Hooven, 1997). Importantly, the development of adaptive emotion regulation skills is critical for children's social competence and minimizes risk for externalizing and internalizing symptoms and aggressive behavior (see Eisenberg & Fabes, 2006; Eisenberg, Spinrad, & Eggum, 2010; Parke, McDowell, Cladis, & Leidy, 2006, for reviews). Without appropriate skills for regulating emotion, children are at a disadvantage among peers, especially in particularly challenging social contexts and interactions that demand self-control and test children's coping and regulation abilities (e.g., Thompson, 1994).

Emotion regulation is one area that is impacted by exposure to parental substance abuse (e.g., Eiden, Edwards, & Leonard, 2004). Research suggests that COSs exhibit less adaptive and less effective emotion regulation strategies compared to children of non-substance-abusing parents (e.g., Eiden, Lewis, Croff, & Young, 2002). It has been argued that the context of parental substance abuse leads to compromised functioning in the process of *co-regulation* within the mother-infant dyad (i.e., the shared process whereby mothers help support infants' self-regulation, see Beeghly & Tronick, 1994, for a review), thus emphasizing the shared process of regulation that becomes dysfunctional within these families starting very early in

development. Substance-abusing mothers have a particularly unique role in children's emotion regulation development, as research shows that substance-abusing fathers are absent in the large majority of families where any parental substance use occurs (Gruber & Taylor, 2006; Osborne & Berger, 2009).

The fields of developmental psychopathology and developmental science have embarked on a journey of discovering *why* emotion regulation tends to be compromised among COSs. There are several factors that may account for part of this risk, including confounding risk factors that often occur in substance-abusing families, such as increased rates of comorbid maternal psychopathology (Mayes & Bornstein, 1996) as well as in-utero drug exposure (e.g., cocaine: Bendersky & Lewis, 1998; Schuetze, Eiden, & Danielewicz, 2009; cigarettes: Schuetze, Lopez, Granger, & Eiden, 2008). Support has been found for a dose-dependent effect of prenatal cocaine exposure such that heavier exposure predicts greater deficits in emotion regulation during early infancy (Schuetze, & Eiden, 2006), indicating that the extent of use matters for children's emotion regulation development. Findings also suggest, however, that unique effects of postnatal substance exposure (i.e., parental substance abuse in the home) also negatively impact children's emotion regulation (Eiden, Lewis, Croff, & Young, 2002; Hickey, Suess, Newlin, & Spurgeon, 1995).

There is also a shared genetic risk among parents and their children that contributes to findings showing that COSs exhibit deficits in emotion regulation. Effective emotion regulation in children depends in part on the extent to which the environment supports the development of adaptive regulation skills, but also depends on a biological predisposition for functional regulatory capabilities at the neurological level (Thompson, Lewis, & Calkins, 2008). There is clear support for the role of genetics in emotion regulation (Hariri & Forbes, 2007), and thus

parents' own emotion regulation abilities can serve as a proxy for the genetic component predicting children's emotion regulation. Extensive research documents that substance abusers tend to have compromised emotion regulation abilities (Keller & Wilson, 1994; Taylor, Bagby, & Parker, 1997), especially for those with comorbid psychopathology (e.g., Litt, Hien, & Levin, 2003). For some substance abusers, drugs are specifically used as a mechanism to reduce the experience of negative affect (i.e., self-medication; Kassel, Hussong, Wardle, Veilleux, Heinz, Greenstein, et al., 2010). Thus, COSs face the combined risk of environmental and genetic factors associated with compromised emotion regulation abilities.

Nonetheless, there is theoretical and empirical support indicating that the *parenting and caregiving context* is a critically important component of the mechanism that explains why COSs are at increased risk for emotion regulation deficits, beyond the effects of prenatal exposure, comorbid psychopathology, and maternal deficits in emotion regulation. Indeed, parenting behaviors and the caregiving environment are important predictors of emotion regulation among COSs (e.g., Eiden, Lewis, Croff, & Young, 2002). For example, substance-abusing mothers tend to be less responsive and sensitive which compromises the extent to which they can support their infants' regulation of emotion (Beeghly & Tronick, 1994). Importantly, parenting behaviors have been shown to mediate the relations between parental alcohol problems and children's emotion regulation (Eiden, Edwards, & Leonard, 2007; 2004). Longitudinal work shows that mothers' and fathers' sensitivity and warmth when their children were two years old mediated relations between fathers' alcohol use disorder when children were 12-18 months of age and children's self-regulation at three years of age (Eiden, Edwards, & Leonard, 2007; 2004). These findings emphasize the important role of parenting behaviors in linking parental alcohol use disorder and child regulation outcomes over time. Although this pattern has been evidenced among less severe

populations (i.e., non-treatment seeking alcohol abusers, as noted above), there are no reported tests of this mechanism for a more general effect of parenting style on children's emotion regulation among more severe groups of substance abusers (i.e. treatment seeking illicit substance abusers). Thus, one contribution of the current study involves testing parenting behaviors as a mediator of the relation between substance abuse history and children's emotion regulation among primarily illicit-substance-abusing women in treatment.

Inconsistent and unpredictable caregiving may specifically compromise the development of appropriate emotion regulation skills among COSs. The lifestyle tendencies of substance abusers in addition to the direct effects of drug use and withdrawal symptoms (i.e., less inhibition, more irritability, fatigue) can lead to a chaotic and unpredictable caregiving environment (Kaplan-Sanoff, & Leib, 1995) that may also be characterized by violence and conflict (e.g., Gruber & Taylor, 2006) which can directly elevate levels of distress among children, as in social learning theory (Bandura, 1977) and theories of emotional security (Davies, Harold, Goeke-Morey, & Cummings, 2002). These experiences associated with exposure to parental substance abuse increase arousal and stress levels for children, making the development of self-regulatory skills more challenging, and making it more difficult to use such skills or to get support for emotion regulation within this type of unpredictable home environment (e.g., Söderström & Skårderud, 2009). Indeed, chaotic home environments characterized by family stress and conflict directly impact children's emotion regulation abilities (El-Sheikh & Cummings, 1997). Greater instability in the caregiving environment is also associated with poorer emotion regulation among infants of polysubstance-abusing mothers (Eiden, Lewis, Croff, & Young, 2002). Thus, inconsistency in parenting and unpredictability in the caregiving

context are especially problematic for COSs and compromise children's ability to develop effective emotion regulation strategies.

In sum, robust effects indicate that factors related to parenting behaviors (e.g., responsiveness, sensitivity, warmth) and the caregiving context more broadly (e.g., conflict, stress, unpredictability) in part explain why parental substance abuse impacts children's emotion regulation abilities, and consistency and predictability in parenting is especially important for COSs. Thus, although various factors contribute risk to children's emotion regulation within the context of parental substance abuse (e.g., prenatal exposure, comorbid maternal psychopathology, maternal emotion regulation difficulties), the effects of compromised parenting and exposure to substance abuse within the caregiving context (i.e., postnatal exposure) may be especially unique and salient predictors of children's emotion regulation. The next step in the field is to gain a more sophisticated and complex understanding of the mechanism(s) within the parenting context that can explain why parental substance abuse impacts emotion regulation in COSs. An extension of previous work would suggest that parent emotion socialization may be an important mediator of the relationship between parental substance abuse and child emotion regulation. There are no reported empirical tests of this question, and a contribution of the current study is to examine this mechanism of interest.

Defining Parent Emotion Socialization

Parents socialize their children around emotions in several key ways, including their reactions to their children's emotions (supportive or non-supportive), their own modeling of emotion (emotional expressiveness), their awareness and acceptance of emotions, and direct teaching about or coaching of children's emotional expression (e.g., Eisenberg, Cumberland, & Spinrad, 1998; Gottman, Katz, & Hooven, 1997). Thus, parent emotion socialization broadly

includes the ways in which parents explicitly and implicitly provide messages to their children about if, when, and how it is appropriate to feel and express emotions, and how to manage or cope with negative emotions.

Gottman, Katz, and Hooven (1997) provide a useful framework for understanding parent emotion socialization and describe "parental meta-emotion philosophy" as the combination of parents' beliefs and behaviors around their children's emotional expression. Gottman et al. (1997) describe the primary components of parental meta-emotion philosophy along the dimensions of awareness and acceptance of their own and children's emotions, and reactions to children's negative emotions. Based on parents' pattern of socializing their children around emotion, parents' behavior is either categorized as emotion "coaching" or emotion "dismissing/ disapproving" (Gottman et al., p. 49). Emotion-coaching parents are aware and accepting of their children's negative emotions and respond to children's expression of negative emotion in a supportive manner with an aim to validate, teach, and problem-solve. Emotion-dismissing or emotion-disapproving parents, on the other hand, minimize children's negative emotions and avoid teaching or problem-solving around children's emotional experiences. Although parent emotion socialization around positive emotions certainly plays a role in children's emotional development (e.g., Fredrickson, 1998), emotion socialization around *negative emotions* is especially critical for fostering adaptive emotion regulation development in young children and helping them learn to cope with distress (Gottman, 2001).

Indeed, although there are multiple indices of parent emotion socialization (i.e., parental reactions to children's emotions, parental emotional expressiveness, beliefs and discussions about emotions), there is a strong theoretical rationale indicating that parental reactions to negative emotions in particular may be especially important for children's emotion regulation.

Children whose parents respond in supportive and adaptive ways to their children's expression of negative emotions (e.g., emotion coaching, problem solving) and who are accepting of their children's emotions are provided with the skills needed to develop their own emotional regulation abilities (e.g., Eisenberg, Cumberland, & Spinrad, 1998; Gottman, Katz, & Hooven, 1997) and tend to have a better understanding of emotions more generally (i.e., "emotional intelligence," Salovey & Mayer, 1990). Emotion regulation skills that develop in the context of a supportive parent-child relationship subsequently set the foundation for children's emotional functioning later in development (Thompson, 1994).

Following this rationale, parental reactions to children's negative emotions is the key element of parent emotion socialization that is reviewed and tested in the current study. Parental reactions to children's negative emotions have been characterized across six qualitatively unique dimensions, including problem-focused reactions (i.e., parental efforts to help solve the problem causing children's negative emotions), emotion-focused reactions (i.e., parental efforts to help the child feel better), expressive encouragement (i.e., parental support of children's emotional expression), minimization reactions (i.e., parental reactions that devalue children's concern and/or their emotional expressiveness), punitive reactions (i.e., the use of punishment as means to control children's emotion expressions), and distress reactions (i.e., the extent to which parents become distressed by their children's emotional expressions) (Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002).

Consistent with Gottman, Katz, and Hooven's (1997) theory regarding two broad patterns of parental reactions to children's negative emotions, these six dimensions can be categorized as supportive / emotion coaching (i.e., problem-focused, emotion-focused, expressive encouragement) or non-supportive / emotion dismissing (i.e., minimization, punitive reactions,

distress reactions). Such patterns of parental reactions are described in the literature as stable traits of emotion-related parenting behaviors, yet there are no reports of empirical tests capturing how stably or consistently these reactions actually occur. A novel contribution of the current study involves capturing the level of consistency in parental reactions to children's negative emotions as a seventh dimension of parent emotion socialization that is hypothesized to be particularly important for emotion regulation in COSs.

Parent emotion socialization is embedded within the larger construct of "parenting" and overlaps with the more general parenting literature (e.g., permissive, authoritarian, authoritative styles, Baumrind, 1966), and indices of parent emotion socialization are strongly associated with parenting styles (e.g., Chan, Bowes, & Wyver, 2009; Gottman, Katz, & Hooven, 1997). General parenting style is important to consider within the context of the relations between parent emotion socialization and emotion regulation (Eisenberg, Cumberland, & Spinrad, 1998; Gottman, Katz, & Hooven, 1997), and parenting style is strongly related to children's emotion regulation (Eisenberg, Chang, Ma, & Huang, 2009; Walton & Flouri, 2010). However, although general parenting style and parent emotion socialization are related, parent emotion socialization encompasses a *unique* set of parenting practices that are especially important for children's emotion regulation. Indeed, general warmth and responsiveness from parents (components of broader parenting styles) do not always indicate that a parent is comfortable and supportive in processing children's *emotional experiences* (Gottman, Katz, Hooven, 1996; 1997). The critical component of parent emotion socialization is the extent to which parents do (supportive reactions) or do not (non-supportive reactions) respond by using children's emotional expression and emotional experiences as opportunities to teach or problem-solve, and not simply whether or not they are warm and supportive, which taps a more general parenting construct (Gottman,

Katz, Hooven, 1996). There is also empirical support showing that both general parenting style and parent emotion socialization uniquely predict children's behavior, which further supports the need to control for general parenting in models that predict child outcomes from parent emotion socialization.

Parent emotion socialization is also conceptually related to "attachment," (Contreras & Kerns, 2000). Secure attachment is indicated by infants' expectations that caregivers will respond appropriately and sensitively to infants' *cues and needs* (Ainsworth, 1979). This concept of parental responsiveness strongly parallels the adaptive and positive form of parent emotion socialization where parents are responsive and sensitive to their children's *emotions* (e.g., Gottman, Katz, & Hooven, 1997). However, parent emotion socialization is uniquely specific to children's emotional development and the emotional needs of children, whereas attachment style reflects parents' responsiveness to children's more general needs, which may include but are not limited to emotional needs (e.g., feeding, response to crying; Ainsworth, 1979). Thus, parent emotion socialization behaviors represent a unique set of parenting practices that are particularly salient for children's emotional development, yet also overlap with related parenting indices, including general parenting style and attachment.

Parent Emotion Socialization and Emotion Regulation Relations

There are currently no reported empirical tests of the relation between parent emotion socialization and children's emotion regulation in substance-abusing families, and no reports on measurement of parent emotion socialization among substance-abusing parents. However, there is empirical work indicating that parental reactions to children's negative emotions (as a component of parent emotion socialization) is an important predictor of children's emotion regulation both in samples of "normative" or "typical" children (e.g., see Eisenberg, Smith, &

Spinrad, 2011; Gottman, Katz, & Hooven, 1997; Morris, Silk, Steinberg, Myers, & Robinson, 2007, for reviews) and also in at-risk samples, including low-income families (Brophy-Herb, Stansbury, Bocknek, Horodynski, 2011) and maltreated children (Shipman, Schneider, Fitzgerald, Sims, Swisher, & Edwards, 2007).

Children's expression of negative emotion provides an opportunity for parents to model and teach effective emotion regulation strategies. For example, parental reactions that encourage problem-solving may provide children with skills for managing negative affect adaptively, whereas dismissive reactions may teach children not to express emotions and may keep them from learning appropriate emotion regulation skills (Gottman, Katz, & Hooven, 1997). One possible explanation is that parent emotion socialization practices may impact children's emotion regulation skills via the impact that parenting strategies have directly on children's regulatory functioning at a physiological level (e.g., vagal tone; Gottman, Katz, & Hooven, 1996). For example, children whose parents engage in supportive emotion-coaching strategies have higher vagal tone (i.e., an indicator of more effective regulation abilities; Gottman, 2001). It is also important to note that parent emotion socialization may mediate relations between parental emotion regulation and children's emotion regulation (Valiente, Lemery-Chalfant, & Reiser, 2007), suggesting that emotion socialization practices may be one factor connecting shared genetic risk that directly impacts children's physiological self-regulatory systems.

Supportive (emotion-coaching) and non-supportive (emotion-dismissing) reactions to children's negative emotions predict variability in children's ability to regulate their emotions. Emotion dismissing parenting behavior predicts less adaptive emotion regulation skills in children (e.g., Lunkenheimer, Shields, & Cortina, 2007), whereas emotion coaching behavior predicts higher levels of emotion regulation skills in children (Gottman, Katz, & Hooven, 1997),

and has also been found to buffer the negative effect of emotion dismissing behavior (Lunkenheimer et al., 2007). There is also support for the relationship between parents' coaching strategies in response to children's negative emotions and physiological indicators of children's emotion regulation (namely resting vagal tone and suppression of vagal tone), and there is longitudinal support for this effect over time (Gottman, Katz, and Hooven, 1997). Parental reactions to children's negative emotions also predict children's ability to regulate emotions in specific social contexts. For example, higher levels of maternal anger in response to children's negative emotions significantly predicted children's maladaptive anger reactions while interacting with preschool peers (Garner & Estep, 2001).

Similar research documents this relation in at-risk populations. For example, depressed mothers of young children exhibit fewer supportive and more non-supportive reactions to children's negative emotions compared to non-depressed mothers, and such reactions predict increased internalizing symptoms in children one year later (Silk, Shaw, Prout, O'Rourke, Lane, & Kovacs, 2011). Additionally, mothers who maltreat their children tend to engage in invalidating emotion socialization behaviors that are characterized by less supportive and fewer emotion coaching reactions to their children's negative emotions (Shipman, Schneider, Fitzgerald, Sims, Swisher, & Edwards, 2007). Furthermore, maternal emotion socialization behaviors mediate relations between maltreatment and children's emotion regulation abilities (Shipman et al., 2007). There is also research showing a direct link between maternal emotion socialization behaviors and toddlers' emotion regulation abilities among low-income families (Brophy-Herb, Stansbury, Bocknek, Horodynski, 2011), suggesting that these relations emerge within the context of demographic risk as well.

Thus, the way parents react to children's negative emotions is a critical predictor of emotion regulation development. Consistent effects indicate that supportive reactions promote positive emotion regulation development in children, whereas non-supportive reactions compromise children's emotion regulation. These effects have been found in general population studies but also in at-risk samples, and mothers at-risk are more likely to engage in non-supportive emotion socialization behaviors compromising their children's emotion regulation development. These findings suggest that the context of parental substance abuse may be a risk factor predicting compromised emotion socialization and subsequent emotion regulation difficulties in children.

Parent Emotion Socialization Mediating the Effect of Substance Abuse Behaviors on COSs' Emotion Regulation

There is a theoretically-informed rationale suggesting that parent emotion socialization may be an important factor impacting emotion regulation in COSs. Importantly, as noted above, parent emotion socialization is strongly associated with parenting style (Chan, Bowes, & Wyver, 2009; Gottman, Katz, & Hooven, 1997), and more general parenting behaviors and the caregiving context strongly predict emotion regulation among COSs (e.g., Eiden, Lewis, Croff, & Young, 2002, as noted above) and also mediate relations between parental substance abuse and emotion regulation (Eiden, Edwards, & Leonard, 2007). Additionally, parent emotion socialization is an important predictor of emotion regulation in other at-risk samples (maltreating parents; Shipman, Schneider, Fitzgerald, Sims, Swisher, & Edwards, 2007; low-income families; Brophy-Herb, Stansbury, Bocknek, Horodynski, 2011, as noted above).

However, characterizing parent emotion socialization among substance-abusing mothers is an unexplored area and thus its effect on emotion regulation in these families is unknown. Nonetheless, it is possible to generate a theory describing what parent emotion socialization may

look like in these mothers by integrating literature from parenting style and caregiving behaviors among substance-abusing parents, attachment patterns between COSs and their parents, and research characterizing parent emotion socialization in other at-risk samples. Pulling from these various literatures informs a theory suggesting that parent emotion socialization practices among substance-abusing mothers will be characterized by more unsupportive reactions and fewer supportive reactions, and will also be characterized by inconsistent reactions to their children's emotions. Furthermore, it is theorized that more severe and pervasive substance abuse histories as well as the extent of current substance abuse will be associated with more compromised emotion socialization behaviors. The specific substance abuse factors that are expected to predict emotion socialization behaviors include: lifetime history of use, length of current abstinence, severity of use (i.e., symptoms of abuse and dependence indicating substance use disorder), and maternal substance abuse during the child's lifetime (i.e., postnatal exposure). To the extent possible, research that supports the relationship between substance abuse factors and parenting behaviors more generally are reviewed below to generate support for this theory.

Effects of current substance use and substance abuse/dependence on parental responsiveness, sensitivity, and warmth

Active substance use can directly impact a mother's style of interacting with her children, and the extent to which she engages and responds positively to her children's needs may depend on whether or not she is currently using (Kerwin, 2005). Substance-abusing parents tend to be less responsive and sensitive to their children's cues and needs (e.g., Eiden, Edwards, & Leonard, 2002), and the large majority of mothers seeking substance abuse treatment do not recognize infants' cues indicating stress or over-stimulation, which is particularly problematic due to COSs' increased difficulty with sensory integration and self-regulation (Velez & Jansson, 2008; Velez et al., 2004).

Current parental alcohol use disorder (i.e., abuse or dependence symptoms) also directly predicts lower levels of parental warmth and sensitivity (Eiden, Edwards, & Leonard, 2007; 2004), and mothers' polydrug (alcohol, marijuana, cocaine) abuse and dependence symptoms predict compromised parenting as indicated by less warmth and more aggression, rejection, and neglect (Locke & Newcomb, 2004). Importantly, parenting behaviors that lack supportiveness and sensitivity compromise emotion regulation in COSs (e.g., Beeghly & Tronick, 1994), and sensitivity and warmth have also been shown to mediate the relation between parental alcohol use disorder and child emotion regulation over time (Eiden, Edwards, & Leonard, 2007; 2004). As an extension of this work, these findings suggest that the same characteristics describing impaired parenting may also describe maternal emotion socialization behaviors, and such emotion socialization behaviors may also be predicted from current substance use patterns and symptoms of abuse or dependence. Especially relevant for the current study, these findings also suggest that non-supportive emotion socialization may mediate relations between exposure to problematic parental substance abuse (indicated by abuse and dependence) and children's emotion regulation.

Effects of current substance use on the emotional climate of the home

COSs may find it challenging to interpret their parents' behaviors and changing emotions that result from intoxication (Gruber & Taylor, 2006), and children may also find that emotional support provided by their parents is often erratic during periods of use (Stanley, Cleaver, & Hart, 2010). Notably, mothers' emotional responses to their children may be dependent on whether or not mothers are actively using. For example, mothers participating in a qualitative study reported that when they were using (specifically methamphetamine) they exhibited more extreme negative emotions with their children and would generally ignore or would not tolerate their

children's emotional expressions (Brown & Hohman, 2006). Although specific parental reactions to children's emotions were not measured in Brown and Hohman's study, these qualitative data suggest that substance-abusing mothers may be unsupportive in response to their children's emotions and that such responses may depend in part on current drug use.

Effects of postnatal substance use exposure on attachment and the mother-infant relationship

Parenting deficits that are directly associated with maternal substance abuse can also impact attachment patterns within these dyads. For example, failure to recognize infants' cues of stress or overstimulation, or not responding supportively to a crying infant can have a negative effect on the shared mother-infant relationship and development of secure attachment (Velez, Jansson, Montoya, Schweitzer, Golden, & Svikis, 2004). Furthermore, infants whose parents abuse substances postnatally (Eiden, Edwards, & Leonard, 2002) and who are exposed to substances prenatally (Rodning, Beckwith, & Howard, 1991; Swanson, Beckwith, & Howard, 2000) tend to develop insecure attachment styles, although most of the work in this area does not account for both prenatal and postnatal exposure simultaneously. In one study that attempted to parse effects, postnatal substance use exposure impacted attachment patterns among mother-infant dyads even while accounting for prenatal exposure (Seifer, LaGasse, Lester, Bauer, Shankaran, Bada, et al., 2004). Thus, there is some support indicating that postnatal substance abuse exposure plays a unique role in the security of the mother-infant relationship and the extent to which mothers respond supportively to their children's needs.

Effects of current substance use on level of consistency of parenting behaviors

Perhaps most obvious, active drug use and the direct effects of being under the influence can severely compromise parenting behaviors. Indeed, the direct effects that drugs have on mothers' functioning, including a compromised ability to attend to social cues, misattribution of

children's behaviors (e.g., attributing negative intent), and increased emotional arousal (Kerwin, 2005) as well as impaired memory and inhibition (Mayes & Bornstein, 1995), all can contribute to inconsistent parenting behaviors. Active drug use and intoxication compromise the extent to which parents are available to provide basic care (e.g., food) for their children (Stanley, Cleaver, & Hart, 2010). Moreover, active substance abuse and associated behaviors (e.g., spending time acquiring drugs, spending time intoxicated) can lead to parents' physical absence (Gruber & Taylor, 2006) and separation from infants (Eiden, Lewis, Croff, & Young, 2002). This level of inconsistency and unpredictability ultimately leaves children not knowing what they can expect from their parents. Importantly, whether or not parents are actively using substances directly impacts the consistency and predictability of their parenting behaviors and is thus expected to hold similar implications for parent emotion socialization behaviors in the current study.

Effects of patterns of substance abuse history on the caregiving environment more broadly

The unpredictable, chaotic, and cyclical pattern of active drug use, sobriety, and relapse that define substance abuse histories for most individuals with a substance use disorder can lead to inconsistency in the caregiving context more broadly (Stanley, Cleaver, & Hart, 2010). Indeed, the caregiving environment provided by polydrug-abusing mothers is often characterized as more unstable compared to non-substance-abusing mothers, evidenced by lack of an adult male at home and infants who sleep and are fed less than average (Eiden, Lewis, Croff, & Young, 2002). Substance-abusing families' lifestyles are often characterized by transient housing and unpredictable caretaking and are often experienced as chaotic (Gruber & Taylor, 2006). Such unpredictable and inconsistent home environments are directly related to periods of drug abuse and intensity of use such that while parents are using, parenting behaviors are

compromised and children may not receive proper attention and supervision, whereas relative predictability is more likely during periods of sobriety (Barnard & McKeganey, 2004).

In general population studies, mothers' report of a more chaotic and disorganized home environment predicts less supportive emotion socialization practices in response to children's expression of negative emotion (Nelson, O'Brien, Blankson, Calkins, & Keane, 2009; Valiente, Lemery-Chalfant, & Reiser, 2007). Because chaotic home environments are common among substance-abusing families and tend to be related to patterns of use (i.e., more chaotic during periods of use), a reasonable extension of this work would suggest that the combination of substance abuse behaviors and the corresponding disorganization that follows may predict less supportive reactions to children's negative emotions, particularly during periods of heavier use.

Additional contextual risk factors that compromise parent emotion socialization behaviors

Although maternal emotion socialization behaviors described in general population studies suggest that mothers tend to engage in more supportive and fewer non-supportive reactions (see Table 1 for details), opposite findings have emerged from studies with at-risk mothers. For example, mothers who report physically-abusing their children engage in emotion socialization behaviors characterized by less supportive reactions, invalidating responses, and lower levels of emotion coaching behaviors in response to children's negative emotions, compared to non-maltreating mothers (Shipman, Schneider, Fitzgerald, Sims, Swisher, & Edwards, 2007; Shipman, Schneider, & Sims, 2005). Although maternal substance abuse was not reported or indicated in Shipman et al.'s (2007; 2005) work, the populations of maltreating women and substance-abusing women clearly overlap, as nearly 50% of substance-abusing mothers are involved with child protective services (Street, Whitlingum, Gibson, Cairns, & Ellis, 2008). Thus, although emotion socialization practices have not been reported within samples of

substance-abusing mothers specifically, these findings indicate that the same pattern of unsupportive reactions that are found among maltreating mothers may emerge among substance-abusing mothers as well, as both maternal maltreatment and substance abuse may represent parallel and perhaps additive risk for compromised emotion socialization behaviors.

Conclusion

In sum, various maternal substance abuse factors (i.e., current/regular substance use, more severe use and abuse/dependence diagnoses, postnatal exposure, and patterns of substance abuse history) predict compromised parenting abilities (less consistent, less sensitive, less responsive), dysfunction of the mother-child relationship, and more impulsive and unpredictable maternal behaviors that often co-occur with chaotic and inconsistent home environments. A parallel of these findings suggests that substance abuse factors may also predict variability in parent emotion socialization practices. Moreover, parent emotion socialization in other at risk samples is more compromised than in general population studies, suggesting that family risk factors can predict more compromised emotion socialization behaviors as well.

The Current Study

The current study addresses several gaps in the literature by assessing parent emotion socialization in a sample of treatment-seeking, substance-abusing women and by capturing a unique component of emotion socialization in this sample (i.e., consistency of maternal reactions to children's negative emotions). The study design also addresses the question regarding substance-abusing parents in comparison to the general population and draws on a meta-analytic technique to estimate levels of parent emotion socialization in reports of general population studies in order to compare socialization behaviors across these populations. The current study also focuses on factors that predict variability in parent emotion socialization and emotion

regulation within COSs based on maternal substance abuse history, and tests the mediating role of parent emotion socialization in the relation between maternal substance abuse behaviors and children's emotion regulation. These mechanisms were explored among substance-abusing mothers specifically given that children are more often exposed to maternal drug use than paternal drug use (Osborne & Berger, 2009). The target age range for children in the current study was 3-8 years of age because it is during early childhood that emotion regulation development is rapidly progressing, and early risk factors for intergenerational transmission of emotion regulation deficits and substance abuse are identifiable in COSs this early in development (e.g., Hussong, Flora, Curran, Chassin, & Zucker, 2008).

Hypothesis 1

Substance-abusing mothers will engage in reactions to their children's negative emotions that are characterized as significantly higher on non-supportive reactions and significantly lower on supportive reactions compared to the reactions that characterize mothers more generally (as estimated by secondary analysis of previously published studies).

Hypothesis 2

The likelihood of engaging in supportive reactions will vary between periods of abuse and sobriety, such that maternal emotion socialization will involve fewer supportive and more non-supportive reactions during periods of substance abuse, and maternal emotion socialization will involve more supportive and fewer non-supportive reactions during periods of sobriety.

Hypothesis 3

Mothers' emotion socialization behaviors will be more consistent within periods of sobriety than within periods of active substance abuse, such that the level of consistency of

reactions within periods of sobriety will be significantly higher than the level of consistency within periods of substance abuse.

Hypothesis 4

Variability in maternal substance abuse factors will predict variability in three key indices of emotion socialization, such that more severe patterns of use will predict less supportive, more non-supportive, and less consistent reactions to children's negative emotions. Specifically, it is hypothesized that 1) *a longer lifetime history of regular substance use, 2) a shorter period of current abstinence, 3) a greater number of abuse/dependence criteria met during the target child's lifetime* and *4) a longer duration of use during the target child's life (i.e., longer postnatal exposure)* will be associated with *greater non-supportive reactions, lower supportive reactions, and lower levels of consistency of reactions.* These effects are hypothesized to remain significant above and beyond general parenting style and control variables that have been shown to impact parenting behaviors, including maternal psychopathology and maternal emotion regulation.

Hypothesis 5

Indicators of parent emotion socialization (supportive reactions, non-supportive reactions, and level of consistency in reactions) will mediate relations between maternal substance abuse factors (lifetime history of regular substance use, length of current period of abstinence, number of abuse/dependence criteria met, and duration of children's postnatal exposure) and children's emotion regulation (see Figure 1 for substantive model). Prenatal drug exposure is expected to have only a direct effect on children's emotion regulation. It is expected that the mediated effects will emerge even when related variables that have been implicated in this mechanism are

included in the model (i.e., maternal psychopathology, child psychopathology, maternal emotion regulation).

Significance and Impact

Gaining a deeper understanding of parent emotion socialization among substance-abusing mothers and the relationship between parent emotion socialization and children's emotion regulation in this population provides an opportunity to inform translational research efforts by identifying potential targets for prevention and intervention. If parent emotion socialization impacts children's emotion regulation within families where substance abuse occurs, then parent emotion socialization may be an ideal target for treatment efforts focused on supporting children's emotion regulation and subsequent social competence across development. Furthermore, identification of the substance abuse factors within this population that differentially predict parent emotion socialization may identify substance abuse behaviors or patterns of use that should be most strongly targeted by substance abuse treatment programs.

CHAPTER 2: METHOD

Participants

The current study employed a multisite cross-sectional design which involved interviewing 78 mothers in substance abuse treatment programs (n= 44 outpatient methadone maintenance, n= 5 intensive outpatient without medication, n= 8 residential program with opiate agonist medication, or n= 21 residential program without medication) across North Carolina (n= 37) and Maryland (n=41). Mothers seeking addiction treatment were asked to participate if they met the following eligibility criteria: 1) have at least one biological child between the ages of three and eight years old with whom they have at least weekly contact; 2) have a history of at least one 2-month period involving regular substance use and at least weekly contact with the target child; 3) have a history of at least one 2-month continuous period of sobriety and at least weekly contact with the target child; and 4) speak English sufficiently to complete informed consent and study procedures. Mothers seeking treatment for any type of substance abuse (e.g., alcohol, opiates, cocaine, etc.) were invited to participate. Primary reasons for ineligibility included lack of contact with the target child (n=4), no substance use during the child's lifetime (n=3), and no periods of sobriety during the child's lifetime (n=3). In cases where mothers had more than one child meeting eligibility criteria between the ages of three and eight years old, one child was randomly selected. As noted previously, the exclusion of fathers is a common consequence of conducting work with these families, as the family context in substance-abusing families often involves little contact with fathers (Gruber & Taylor, 2006).

Four participants had significant missing data due to failure to complete the interview and were subsequently dropped from the current sample, resulting in a final sample size of 74. Maternal and child characteristics by treatment program, by recruitment site, and for the full sample can be found in Table 2. The number of women from outpatient and residential treatment programs were distributed similarly across recruitment site (North Carolina: 60% outpatient, 40% residential; Maryland: 62% outpatient, 38% residential). The mean age for mothers was 31.5 (*SD*= 6.68; range 19-45 years) and they self-identified as Caucasian (n=39), African American (n=23), biracial/multiracial (n=6), American Indian (n=3), Hispanic (n=2), and Asian (n=1). Regarding maternal education level, seven mothers completed 8th grade or below, 19 started high school but did not graduate, 27 completed high school or earned a GED, 13 started college but did not graduate, and eight completed college or technical/vocational school. Children were 57% female with a mean age of 5.2 (*SD*= 1.72; range 3-8 years), and they were identified by their mothers as Caucasian (n=32), African American (n=23), biracial/multiracial (n=12), American Indian (n=3), Hispanic (n=3), and other (n=1). Forty-five percent of mothers reported past and/or current Child Protective Services involvement related to their target child. Eighty two percent of target children also had a substance-using biological father.

Procedure

Recruitment efforts involved posting flyers and making announcements in waiting areas, during group times, and during dosing hours for those in methadone maintenance. Women who were interested in participation completed a private screening procedure to determine eligibility and, if eligible, an informed consent procedure was completed. Efforts were made to maintain participant anonymity due to the sensitive nature of recruiting from a high-risk sample; women were not required to provide their names or signatures and thus informed consent was completed

verbally. Participants were also provided with a copy of the consent form to take home. Participants' first names and phone numbers were only collected in cases where mothers requested to set up an appointment for a later date and this information remained entirely unlinked with the data or with identification numbers. The principal investigator completed all informed consent procedures and conducted all interviews in a private room provided by the treatment centers or in the women's homes for those in residential care.

Additional precautions were taken in order to protect participant confidentiality and to increase the likelihood that mothers felt comfortable to respond honestly to sensitive items. All responses for the majority of the interview were made anonymously by using a Computer Assisted Self-Interview (CASI) system (i.e., mothers were not asked to make their responses out loud to the examiner). Participants were given the option to either complete the questionnaire on their own (selected by n=48) or have the examiner read the entire questionnaire aloud to them (selected by n=15). A number of individuals requested to change administration methods partway through the interview (n=11). When requested, the examiner read aloud each item from the interview corresponding to the same items that appeared on the participant's private computer. If the participant requested to complete the questionnaire on her own, she was able to make her responses directly on the computer after reading each item to herself. Two small portions of the interview (a time-line follow back procedure and items regarding alcohol and drug abuse and dependence) were conducted in a more formal clinical-interview format in order to help the participants arrive at their answers more easily and efficiently. In addition to providing privacy, the purpose of the one-on-one interview was to allow for rapport and to ensure that participants understood each item and could ask for clarification when needed, given that reading ability is often low in this population (Davis, Jackson, George, & Long, 1993).

Each interview was completed in approximately two hours. Mothers were provided with a $25 Wal-Mart gift card for their participation (part of which included a $10 "bonus" for completing the full interview). If mothers elected to terminate participation before completing the full interview, the payment was prorated and they earned $5 per 30 minutes up to a maximum of $15. Child care was provided by trained undergraduate research assistants.

Measures

Demographics

Mothers were asked to report their age, ethnicity, and highest level of education, as well as the gender, age, and ethnicity for their target child.

Maternal Substance Abuse

Lifetime history of regular substance use, drug of choice, and duration of current abstinence were assessed by completing portions of the Drug/Alcohol Use grid from the Addiction Severity Index (ASI; McLellan, Kushner, Metzger, Peters, Smith, Grissom, et al., 1992). **Lifetime history of regular substance use** was assessed by asking mothers to report on the total number of years in their lifetime that they were using drugs and/or alcohol regularly (i.e., at least three times per week). The maximum number of years reported for either drug or alcohol use was employed in the current set of analyses, with an average of 10.34 years of regular use (*SD*=7.55; range 4 months to 33 years). Mothers were also asked to report their **drug of choice** which was dummy coded. The majority of mothers identified their drug of choice as opiates (n=28) or identified themselves as polysubstance users (n=27 selected two or more drugs of choice). Additional drugs of choice included cocaine (n=8), marijuana (n=5), alcohol (n=3), and hallucinogens (n=2). Drug of choice data were missing for one individual. Finally, mothers were asked “How long has it been in months since you have used any alcohol or drugs?” For

each mother, the shortest length of abstinence from either alcohol or drugs represents the **duration of current abstinence.** All prescription drugs that were taken *as prescribed* were not included in this estimate (e.g., methadone). The average length of current abstinence was 4.52 months (*SD*= 7.31; range 0 to 32 months). At the time of the interview, 24% of mothers (n=18) were in a period of active drug use, and an additional 24% (n=18) had been clean for 30 days or less. Fourteen percent of mothers had been abstinent for a year or longer (n=10).

Substance abuse/dependence criteria met during the target child's lifetime was assessed by asking mothers the four alcohol/substance abuse items and the seven alcohol/substance dependence items from the E module of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First & Gibbon, 2004) in regards to the most problematic period of use during their target child's life. The abuse and dependence questions were asked for the class(es) of drugs they endorsed using regularly and having problems with during this period of time. The total number of abuse (maximum of four) and dependence (maximum of seven) criteria met for the most problematic substance was used to quantify the **number of substance abuse/dependence criteria met** during the target child's life, with a total maximum score of eleven. The abuse criteria were asked as a way to capture less severe use (e.g., legal consequences, substance use in physically hazardous situations) and the dependence criteria captured more severe use (e.g., tolerance, withdrawal, desire and unsuccessful efforts to cut down on use), in accordance with the definition of substance use disorders in the DSM-IV (American Psychiatric Association, 2000). Substance dependence supersedes substance abuse (i.e., an individual cannot be diagnosed with both abuse and dependence for the same substance), and one of four criteria must be met in order to diagnose substance abuse, whereas three of seven criteria must be met in order to diagnose substance dependence (DSM-IV; American Psychiatric

Association, 2000). In the current sample, 15 mothers met criteria for alcohol dependence, 2 met criteria for alcohol abuse, and 57 reported no problems with alcohol; 71 met criteria for drug dependence, 1 met criteria for drug abuse, and 2 reported no problems with drugs. Endorsement rates for all 11 items were summed together in the current analyses, with an average score of 9.07 endorsed criteria (SD=2.17; range 1 to 11) for the most problematic substance.

Duration of use during the target child's life (i.e., postnatal exposure) was assessed in order to capture the proportion of the target child's life during which each mother was in regular contact with the child and also using substances (i.e., postnatal substance exposure). Mothers reported the number of months during which they had less than weekly contact with their target child since he/she was born. Weekly contact was defined as a period of time lasting at least two hours during which the mother was directly interacting with the child. With respect to the periods of time when mothers were in contact with their child, they reported the number of months of regular substance use (i.e., at least three times per week). In order to increase the reliability of mothers' report, a time-line follow-back procedure adapted from Sobell, Maisto, Sobell, and Cooper (1979) was employed by using a life history calendar to overlay periods of use and periods of contact during the target child's life (see Figure 2 for an example time-line follow-back administration). To quantify postnatal substance abuse exposure, a ratio was calculated by dividing the number of months of mothers' regular substance use while in contact with the child by the child's age in months. The resulting number takes into account the periods of time when the mother was using but was not in contact with her child (i.e., periods of use that do not coincide with child exposure), thus yielding a better estimate of the number of months that substance use and contact with children overlap. This value represents **duration of postnatal**

exposure. In the current sample, children were exposed to maternal substance use for approximately 50% of their lives on average (M=49%; SD=26%; range 7% - 97%).

Maternal substance use during pregnancy (i.e., prenatal exposure) was assessed by asking mothers a series of questions adapted from the Composite International Diagnostic Interview (World Health Organization, 1997). Mothers reported the specific substances they used regularly (at least 3 times per week) during any part of their pregnancy, including methadone as prescribed. Mothers were then asked for how many months during their pregnancy they regularly used drugs, alcohol, or methadone as prescribed (or a similar opioid agonist). Because the reported periods of use were not always mutually exclusive, the maximum of these three values was used to characterize the **duration of prenatal exposure**. The average number of months of prenatal exposure in the current sample was approximately 4 months (M=3.71; SD= 3.95; range 0-9 months). Mothers were also asked to report their target child's **birth weight** since birth weight is often correlated with prenatal drug exposure (Irner, Teasdale, Nielsen, Vedal, & Olofsson, 2012). Target children in the current sample weighed an average of 6 pounds 4.8 ounces at birth (*SD*= 1 pound, 6.6 ounces). The correlation between birth weight and prenatal exposure was quite small (r = -0.06).

Parent Emotion Socialization

Mothers were asked to report on their reactions to their target child's negative emotions by completing the Coping with Children's Negative Emotions Scale (CCNES; Fabes, Eisenberg, & Bernzweig, 1990; Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002). This measure captures parents' typical responses to their children's expression of negative emotion. The scale includes 12 scenarios that describe a child who is upset, worried, sad, or angry, and for each scenario there are six corresponding descriptions of hypothetical parental reactions (e.g., I would:

"encourage my child to talk about what scared him/her."). For each of the six reactions, mothers were asked to indicate on a scale from (1) very unlikely to (7) very likely, how likely they are to respond to their children's negative emotions in the particular way described. For each of the 12 scenarios there are six questions about parental reactions, thus totaling 72 items.

Six resulting subscales represent qualitatively unique dimensions of parental reactions to children's emotions, including three supportive subscales (problem-focused reactions, emotion-focused reactions, and expressive encouragement) and three non-supportive subscales (minimization, punitive, and distress reactions). The composite score for each of the six dimensions was calculated as the mean of all items from each subscale. Reliability of the six subscales was found to be acceptable in the current sample (expressive encouragement $\alpha = .86$, emotion focused $\alpha = .85$, problem focused $\alpha = .85$, distress $\alpha = .61$, punitive $\alpha = .69$, and minimization $\alpha = .68$). As is common in previous research (e.g., Nelson, O'Brien, Blankson, Calkins, & Keane, 2009), an aggregate score for supportive reactions (the mean of problem-focused, emotion-focused, and expressive encouragement) and an aggregate score for non-supportive reactions (the mean of minimization, punitive, and distress reactions) were calculated. Supportive and non-supportive reactions are considered separate broad dimensions and do not necessarily represent a continuum of supportiveness (Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002). Results from the current sample yielded a mean supportive reaction score of 6.09 ($SD = 0.76$) with excellent internal reliability ($\alpha = .94$) and a mean non-supportive reaction score of 2.63 ($SD = 0.72$) with good internal reliability ($\alpha = .85$).

For the purposes of the current study, the CCNES was adapted such that in addition to the six dimensions noted above, a seventh dimension was included that taps the level of consistency of reactions. For each of the 12 hypothetical situations, a seventh question was asked: "In general

when this type of situation happens, how likely are you to react to your child's emotions in *the same way* each time? (whatever your reaction might be)." The composite score for the consistency subscale was created in the same way as the other six subscales, by calculating the mean of all subscale items. The mean consistency subscale score was 5.62 (*SD*= 1.42) and demonstrated excellent reliability in the current sample (α = .96).

The resulting 84 items (the six original dimensions and the new seventh dimension, for each of 12 scenarios) make up the complete CCNES scale. The first time mothers completed the CCNES, the original instructions from the measure were used and mothers were asked to consider their typical reactions to their children's negative emotions overall during the target child's life. This first administration of the CCNES thus represents global parent emotion socialization without respect to a particular period of time during mothers' lives. Three total scores were calculated from the first CCNES administration: **typical supportive reactions, typical non-supportive reactions,** and **typical level of consistency of reactions**.

The CCNES was administered to each mother a second and third time, with the goal of capturing emotion socialization *within* periods of problematic substance use and periods of sobriety. Each mother was asked to consider the period of time lasting at least two weeks when she was in regular contact with the target child and when her substance involvement was regular (at least three times per week) and most problematic (i.e., most significant impairment). Following identification of this period, the CCNES was completed again and mothers were asked to consider only this very specific period of time when responding to each item. The aggregate scores for **supportive reactions** (M= 5.66, *SD*= 1.21, α = .97), **non-supportive reactions** (M= 3.37, *SD*= 1.20, α = .94)**,** and **consistency of reactions** (M= 5.06, *SD*= 1.85, α = .98) ***within* periods of substance abuse** were calculated as described above.

Each mother was also asked to consider the period of time lasting at least two weeks during her target child's life when she had the most successful period of sobriety and when she was in regular contact with her child. Following identification of this period of time, the CCNES was completed one last time and again mothers were asked to consider only this very specific period of time when responding to each item. The aggregate scores for **supportive reactions** (M= 6.30, *SD*= 0.73, α = .95), **non-supportive reactions** (M= 2.54, *SD*= 0.80, α = .89)**,** and **consistency of reactions** (M= 5.85, *SD*= 1.54, α = .98) ***within*** **periods of sobriety** were calculated as described above.

The first CCNES administration was always presented to the participants as the first series of questions about emotion socialization. However, the second and third administrations of the CCNES were counterbalanced such that the order in which each participant completed these administrations was random, to minimize the potential effects of client reactivity and lethargy on response patterns. Additionally, the three administrations were administered non-contiguously across the full battery in order to minimize spillover effects.

Environmental Stressors

Each mother was asked to report the number of contextual risk factors that occurred during the selected periods of most problematic use and periods of sobriety during the target child's lifetime, including experiences with trauma, violence, involvement with the law, economic hardship/poverty, and increased psychological distress, that were considered additional environmental stressors during these periods. The total sum of endorsed stressors yielded the environmental stressors total for periods of use and sobriety. Assessing for such environmental stressors provided an opportunity to better characterize the periods of abuse and sobriety and to better understand if such stressors (uniquely from or in combination with substance abuse

factors) may contribute to variability in emotion socialization practices. Mothers reported significantly more environmental stressors during periods of drug use (M=2.07, *SD*=1.60; range 0-5) than periods of sobriety (M=0.85, *SD*=1.05; range 0-4; $t(70)=7.04$, $p<.0001$). Thus, in order to control for contextual factors that coincided with maternal substance use, the total environmental stressor score during periods of use was included as a control variable in the current analyses.

Parenting Style

General parenting practices were assessed by asking mothers to complete the 32-item Alabama Parenting Questionnaire – Preschool Revision (APQ-PR; Clerkin, Marks, Policaro, & Halperin, 2007) which was adapted from the original 42-item APQ (Frick, 1991) by dropping ten items from the original version that were considered inappropriate for children of younger ages. The APQ-PR taps three parenting factors, including Positive Parenting, Inconsistent Parenting, and Punitive Parenting. Each item was presented as a statement about the child and/or the parenting role, and mothers were asked to rate how often various situations involving their child typically occur. Response options include: (1) never, (2) almost never, (3) sometimes, (4) often, and (5) always. Scores for the three subscales were calculated as the mean of all subscale items, and an overall negative parenting style score was calculated as the mean of the three subscales after reverse-scoring items such that higher scores indicate more negative parenting qualities. Due to highly significant correlations between the three subscales (range $r = -.36$ to $r = -.56$), the overall Negative Parenting score was used in the current analyses.

Although target children in the current sample range from three to eight years old, the APQ-PR has greatly improved psychometric properties compared to the original APQ, even among older children (Clerkin, Marks, Policaro, & Halperin, 2007). In the current sample, the

Positive Parenting subscale (M= 4.47, *SD*= 0.41, α = .84), Inconsistent Parenting subscale (M= 2.45, *SD*= 0.67, α = .74), Punitive Parenting subscale (M= 1.70, *SD*= 0.54, α = .60), and the overall Negative Parenting scale (M= 1.89, *SD*= 0.44, α = .87) all demonstrated adequate reliability ranging from acceptable to good. Although parenting style and emotion socialization are conceptualized as unique constructs, they are related and should thus be moderately correlated with one another. In support of the convergent validity of both measures, the overall Negative Parenting scale was strongly correlated with the overall supportive reactions score (*r* = -.38, *p*=.0009) and non-supportive reactions score (*r* = .42, *p*=.0002) from the emotion socialization measure (CCNES).

Child Emotion Regulation

Child emotion regulation was assessed with the Falling Reactivity & Soothability subscale from the Children's Behavior Questionnaire (the 195-item questionnaire; Rothbart, Ahadi, Hersey, & Fisher, 2001). This measure is most consistent with the proposed definition of emotion regulation noted above and serves as the outcome measure for the current study. The 13 items from this subscale tap how easily children were able recover from elevations in affect (distress, excitement, overall arousal) in the previous six months and was designed to assess children between the ages of three and eight years. Each item was presented as a statement that describes the way children may respond to various situations (e.g., "My child is very difficult to soothe when s/he has become upset."). Mothers reported on a scale of 1-7 how true the statement is about their child's reactions, including (1) extremely untrue of your child, (2) quite untrue of your child, (3) slightly untrue of your child, (4) neither true nor false of your child, (5) slightly true of your child, (6) quite true of your child, and (7) extremely true of your child. Mothers were asked to report "not applicable" if they had never witnessed their child in a given situation. The

total subscale score was calculated by taking the mean of all applicable items, with higher scores indicating more effective emotion regulation. Items that were omitted or that were indicated as not applicable were not included in the final mean score. Results from the current sample yielded a mean child emotion regulation score of 4.84 (*SD*= 0.89) and demonstrated adequate internal consistency (α = .72).

Maternal Emotion Regulation

Mothers reported on their ability to regulate their own emotions by completing the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a 36-item adult self-report measure yielding six subscales (Nonacceptance of Emotional Responses, Difficulties Engaging in Goal-Directed Behavior, Impulse Control Difficulties, Lack of Emotional Awareness, Limited Access to Emotion Regulation Strategies, and Lack of Emotional Clarity). Each item was presented as a statement about thoughts, experiences, and responses or strategies related to the experience of emotion. Mothers indicated how often these various statements applied to them and response options include: (1) almost never – 0-10%, (2) sometimes – 11-35%, (3) about half the time – 36-65%, (4) most of the time – 66-90%, and (5) almost always – 91-100%. The total DERS scale score was calculated by first reverse-scoring items so that higher values correspond to poorer emotion regulation, and then taking the sum of all items, with possible scores ranging from 36 to 180. Results from the current sample yielded a mean maternal emotion regulation score of 78.43 (*SD*= 25.41) with excellent internal reliability (α =.95).

Child Psychopathology

Mothers reported on their target child's psychological and behavioral functioning by completing the Strengths and Difficulties Questionnaire (Goodman, 1997). The 25 item

questionnaire yields five subscales (emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial skills) and a Total Difficulties composite score. Each item describes a particular behavior or emotion and asks mothers to determine how true (0=not true, 1=somewhat true, 2=certainly true) each description is of their child's behavior in the previous two weeks. The score for each subscale was calculated by summing all subscale items, with possible scores ranging from 0 to 10. The Total Difficulties composite score was used in the current analyses and was calculated by taking the sum of all subscale scores (with the exception of the prosocial scale), with possible scores ranging from 0 to 40. Results from the current sample yielded a mean Total Difficulties composite score of 9.86 (*SD*= 6.11; range 0 to 25), with good internal reliability (α = .85). In the current sample, 55 children (74%) were classified within the normal range of functioning (scores of 13 or below), 7 children (10%) were classified in the borderline range (scores of 14-16), and 12 children (16%) were classified as having clinically significant problems (scores of 17 or above; Goodman, 1997). SDQ scores from a large nationally-representative sample of 4-7 year old children yielded a mean Total Difficulties composite score of 7.4 (*SD*=5.3), with 88% falling in the normal range, 6% falling in the borderline range, and 6% falling in the clinically significant range (Bourdon, Goodman, Rae, Simpson, Koretz, 2005), indicating that the current sample exhibits higher rates of child psychopathology than a normative sample of children in the United States. In support of convergent validity for the child psychopathology and child emotion regulation measures, the Total Difficulties composite score was strongly correlated with child emotion regulation abilities (r = -.51, p <.0001).

Maternal Psychopathology

Mothers reported on their own psychiatric symptoms by completing the 53-item Brief Symptom Inventory (BSI; Derogatis, 1975; 1993). This measure captures adult psychopathology

across a number of domains resulting in nine subscales. Mothers were asked to rate each item on a 5-point scale indicating how much they were distressed by various symptoms in the previous week (e.g., “nervousness or shakiness inside,” “feeling lonely even when you are with people.”). Response options included (0) Not at all, (1) A little bit, (2) Moderately, (3) Quite a bit, and (4) Extremely. The Global Severity Index (GSI) is an overall indicator of the level and intensity of psychological distress and was calculated by taking the mean score across all 53 items, with higher scores reflecting greater psychological distress. Results from the current sample yielded a mean Global Severity Index score of 0.89 (*SD*=0.76; range 0 to 3.43), with excellent internal reliability ($\alpha = .97$).

CHAPTER 3: RESULTS

Preliminary Analyses

Checking Assumptions

Preliminary analyses included checking the distribution of all variables and checking assumptions of multivariate normality and linearity, homogeneity of error variance, and independence of errors. Variable assumptions were adequately met. Regression diagnostic tests were conducted to check for model assumptions, model fit, and potential outliers. Model assumptions for regression and structural equation modeling techniques were adequately met. Models were evaluated with and without the few observations that were identified as outlying on dependent or predictor variables, but none appeared to have undue influence and were thus retained in all analyses.

Descriptive Statistics

Mean scores for key variables by treatment program, by recruitment site, and for the full sample can be found in Table 3. Several significant differences emerged across treatment settings and recruitment sites (see Table 3). Compared to women in outpatient treatment, women in residential care reported significantly more abuse/dependence criteria, postnatal drug exposure, and environmental stressors during periods of drug use, as well as significantly fewer supportive reactions and significantly more non-supportive reactions to children's emotions during periods of drug use. Compared to mothers recruited in North Carolina, Mothers recruited in Maryland reported significantly longer lifetime histories of regular use, and higher levels of non-supportive reactions to children's emotions at the time of the interview and also during periods of sobriety.

Thus, treatment program and recruitment site were controlled in the current analyses. Zero-order correlations between all continuous variables are included in Table 4.

Exploratory Factor Analysis

An exploratory factor analysis (EFA) was completed in M*Plus* version 5.2 (Muthén & Muthén, 1998) for each of the 7 subscales of the CCNES to test for unidimensionality and to determine if all items load appropriately onto the corresponding subscales. Factor analyses were conducted with the CCNES scores emerging from the first administration (i.e., typical emotion socialization practices and not context-specific). Prior to conducting the EFAs, item distributions and variances were explored to evaluate floor and ceiling effects and to determine if endorsement rates for different response options were adequately variable. The criteria for identifying problem items were: a) if any given response option was endorsed by 70% or more of the sample, and b) the remaining 30% was poorly distributed across the remaining response options. Sixteen problematic items were identified from the first administration of the CCNES and were subsequently dropped a priori[1]. Problem items in the first administration were cross-referenced with problem items from the drug-use and sober versions of the CCNES. Only two items in the drug-use version of the CCNES had a response option endorsed by 70% or more of the sample and these items were also identified as problem items in the first administration. There were 19 problem items identified in the sober version of the CCNES, and 16 of these items had also been identified as problem items in the first administration. The presence of 3 additional problem items in the sober version indicates that in particular contexts several items may not function as well; however, these three items were retained for purposes of consistency in scoring across administrations.

[1] Items included: distress reactions items 4 & 6; minimization reactions item 7; emotion focused items 4, 6, 7, 10, 11, & 12; problem focused items 3, 4, 6, 7, 9, 10, & 12.

After dropping the 16 problem items, separate one-factor EFAs were conducted for each of the seven scales by using Maximum Likelihood estimation and Oblique Promax rotation (see Table 5). It was noted that item 8 performed poorly and did not load well on four of the seven subscales (problem focused reactions, distress reactions, punitive reactions, and minimizing reactions). In support of dropping item 8, the item prompt ("If my child receives an undesirable birthday gift from a friend and looks obviously disappointed, even annoyed, after opening it in the presence of the friend, I would…") uniquely pulls for qualitatively different responses from mothers and may encourage more non-supportive reactions in an effort to teach children appreciation and respect, which may not be reflective of how mothers would respond to their children in the other 11 situations. Given this rationale, three remaining steps were followed in order to complete the EFAs for each of the seven subscales: 1) item 8 was dropped and the one-factor model was re-estimated; 2) scree plots of eigenvalues were reviewed to determine the ideal number of factors for each scale and patterns of factor loadings were evaluated; if a large number of items loaded poorly, a two-factor solution was estimated (the one-factor solution fit best for all subscales with the exception of distress reactions which fit best with a two-factor solution); 3) any additional items with loadings below .30 were dropped from the corresponding subscale. One cross-loading item (item 7) was dropped from the two-factor solution for distress reactions. The two resulting factors included externalized distress reactions directed at the child (e.g., I would "get angry at my child," "get upset with him/her for being so careless and then crying about it.") and internalized distress reactions (e.g., I would "feel upset myself," "feel upset and uncomfortable because of my child's reactions."). The final resulting models for the 8 subscales are included in Table 6.

Confirmatory Factor Analysis

A two-factor confirmatory factor analysis (CFA) was conducted using robust Maximum Likelihood estimation in M*Plus* version 5.2 (Muthén & Muthén, 1998) to determine if the CCNES falls along the two primary dimensions of supportive reactions and non-supportive reactions. An additional goal of the CFA was to determine if the new consistency subscale fell along the supportive dimension or along its own separate dimension. In order to allow for model identification given the modest sample size, eight testlets served as indicators for the two latent factors, with four testlets loading onto each factor. Testlets were created as mean scores for each of the 8 subscales resulting from the EFAs above. The supportive factor was indicated by scores for the emotion focused, expressive encouragement, problem focused, and consistency subscales, and the non-supportive factor was indicated by scores for distress reactions (two subscales), minimizing, and punitive subscales. Testlets were restricted to only one factor, and the two factors were allowed to covary. Fit indices showed excellent model fit and suggest that the two-factor CFA fit the data well (χ^2 (19) = 21.83, p= .29; Root Mean Square Error of Approximation =.045, 90% CI: 0.00 – 0.115; Comparative Fit Index =0.99; Tucker-Lewis Index =0.98). Although the internalized distress reactions scale did not load as strongly as the other three non-supportive scales onto the non-supportive reactions factor, all modification indices resulting from the analysis were extremely small. Model fit did not improve after allowing the two distress reactions scales to covary or allowing the internalized distress reactions scale to cross-load onto the supportive factor, and thus the original model was retained. Extremely small modification indices and generally large factor loadings indicated that all eight testlets fell along the hypothesized dimensions (see Figure 3). The supportive and non-supportive factors were significantly correlated (r = -.29, p=.03).

Although the consistency subscale fell along the supportive dimension, in the current set of analyses the consistency subscale was kept separate from the overall supportive dimension for two reasons. First, the consistency subscale loaded less strongly than the other three subscales on the supportive factor. Second, a key goal of the current study was to explore the unique importance of consistency of reactions which requires that the subscale remain separate. Means, reliability estimates, and zero order correlations between the final CCNES scales can be found in Table 7. Means and reliability estimates for the final CCNES scales across all three administrations (typical, period of drug use, period of sobriety) are presented in Table 8.

Hypothesis 1

It was hypothesized that substance-abusing mothers engage in reactions to their children's emotions that are characterized as significantly higher on non-supportive reactions and significantly lower on supportive reactions compared to the reactions that characterize mothers more generally, as estimated by secondary analysis of previously reported studies. Nine samples were identified from general population studies where the CCNES was used as the measure of parent emotion socialization in order to make direct comparisons to the current study. Studies were included if: a) all original six subscales from the CCNES was employed, b) children fell within a similar age range as the current study (i.e., approximately 3-8 years old), c) parents and children were described as a community sample and/or there were no indications of family risk factors (e.g., substance use, psychopathology, poverty), and d) the sample was collected in the United States. In cases where multiple publications describe the same sample, results from the report with the largest sample size were retained for current analyses. Five articles did not provide complete data for the CCNES subscales in the published article and authors were contacted directly. Three authors provided the required information; two authors were unable to

provide the data and thus samples from their articles could not be included (Fabes, Leonard, Kupanoff, & Martin, 2001; Perlman, Camras, & Pelphrey, 2008). A brief description of the seven studies included for Hypothesis 1 can be found in Table 1.

In order to calculate an estimated aggregate mean for supportive and non-supportive reactions across the seven samples, the grand mean was estimated by weighting each sample mean by the sample size. In order to estimate the total variance, the pooled sample variance was calculated such that variance from each sample was also weighted according to the sample size. The weighted means across the control samples were M=5.55 (*SD*=0.67) for supportive and M=2.46 (*SD*=0.61) for non-supportive reactions, and the average scores for the current sample were M=6.09 (*SD*=0.75) for supportive and M=2.63 (*SD*=0.71) for non-supportive reactions. Two separate one-sample *z*-tests were conducted in order to test for a significant difference between the mean scores from the current sample and the estimated aggregate means for the control samples. The *typical supportive reactions score* and the *typical non-supportive reactions score* were used for the current study. All original CCNES items were retained for Hypothesis 1 to allow for appropriate comparisons between the current sample and those represented in the literature. Results showed that mothers in the current sample reported both significantly more supportive ($z=6.98$, $p < 0.0001$) and significantly more non-supportive ($z=2.41$, $p = .02$) reactions to their children's emotions compared to the general population of mothers (see Figure 4). However, similar to general population studies, substance-abusing mothers reported engaging in "emotion coaching" styles of socialization overall, involving more supportive reactions than non-supportive reactions.

Hypothesis 2

It was hypothesized that the likelihood of engaging in supportive reactions will vary between periods of substance abuse and sobriety, such that maternal emotion socialization will involve fewer supportive and more non-supportive reactions during periods of substance abuse, and will involve more supportive and fewer non-supportive reactions during periods of sobriety. Two paired-samples t-tests were completed in order to compare the mean levels of supportive and non-supportive reactions within periods of substance abuse (supportive: M= 5.47, *SD*= 1.37; non-supportive: M= 3.23, *SD*= 1.33) and within periods of sobriety (supportive: M= 6.31, *SD*= 0.80; non-supportive: M= 2.25, *SD*= 0.85). Mothers were significantly more supportive than non-supportive during periods of both drug use ($t(73)=8.01$, $p<.0001$) and sobriety ($t(73)=25.34$, $p< .0001$), although the difference was smaller during periods of drug use. However, between contexts, results indicated that mothers were significantly more non-supportive while using than while sober ($t(73)=6.56$, $p<.0001$), and were significantly more supportive while sober than while using ($t(73)=5.69$, $p<.0001$). Results are presented in Figure 5.

Hypothesis 3

It was hypothesized that mothers' emotion socialization behaviors will be more consistent within periods of sobriety than within periods of active substance abuse, such that the level of consistency of reactions within periods of sobriety will be significantly higher than the level of consistency within periods of substance abuse. A paired-samples t-test was completed in order to compare the means of the consistency of reactions score across periods of sobriety (M=5.86, *SD*=1.54) and drug use (M=5.04, *SD*=1.85). Results indicated that mothers were significantly more consistent in their reactions to children's emotions during periods of sobriety compared to periods of active substance use ($t(73) = 4.51$, $p < .0001$). However, it is important to

highlight that mothers reported being more consistent than not within *both* contexts of use and sobriety, with scores indicating that overall, mothers were very likely to respond the same way each time to their children's expression of negative emotion.

Hypothesis 4

It was hypothesized that a longer lifetime history of regular substance use, a shorter period of current abstinence, a greater number of abuse/dependence criteria met during the child's lifetime, and longer postnatal exposure will be associated with greater typical non-supportive reactions, lower typical supportive reactions, and lower levels of typical consistency of reactions. Zero order correlations between predictors and outcomes can be found in Table 4. These effects were hypothesized to remain significant above and beyond general parenting style and additional covariates that have been shown to impact parenting behaviors, including maternal psychopathology and maternal emotion regulation. All independent variables were evaluated for multicollinearity prior to model estimation. Maternal psychopathology (BSI) and maternal emotion regulation (DERS) were very strongly correlated (r= 0.79, p < .0001) and were thus combined into one indicator by standardizing and averaging scores. Three separate hierarchical multiple linear regression analyses were conducted assuming fixed effects models each with one continuous outcome. The outcome measures across the three models were typical non-supportive reactions, typical supportive reactions, and typical consistency of reactions, respectively. The same demographic and socioeconomic control variables (child age, child gender, child ethnicity, maternal age, maternal education, and site of recruitment) were entered in the first step of each model and non-significant covariates were subsequently dropped. In the second step, remaining control variables that are more substantively related to parenting and substance use were entered (birth weight, prenatal drug exposure, current treatment program,

drug of choice, parenting style, child psychopathology, maternal psychopathology/emotional dysregulation, and environmental stressors), and again all non-significant covariates were dropped. In the third and final step of each model, the four maternal substance abuse factors (lifetime history of regular substance use, duration of current abstinence, number of abuse/dependence criteria met, and postnatal exposure) were simultaneously entered.

Results for the three regression models are presented in Table 9. Maternal substance abuse did not significantly predict supportive reactions (model 1) or non-supportive reactions (model 2). However, greater impairment as indicated by more abuse/dependence criteria met was associated with *more* consistent reactions ($\beta = 0.17$, $p = .03$), whereas longer periods of abstinence was associated with *less* consistent reactions ($\beta = -0.05$, $p = .03$, model 3). These effects were significant above and beyond the large effect of negative parenting style which significantly predicted less supportive reactions ($\beta = -0.81$, $p = .00009$; model 1), more non-supportive reactions ($\beta = 0.64$, $p = .003$; model 2), and less consistent reactions ($\beta = -1.37$, $p = .0002$; model 3) across all three models.

Sensitivity analysis for hypothesis 4: Exploring effects of maternal substance abuse on emotion socialization during periods of drug use (context specific)

The outcome measures in the three regression models above included the typical emotion socialization behaviors that were not context specific. The set of sensitivity analyses explored the relationship between maternal substance abuse factors and emotion socialization behaviors specifically during periods of drug use. Maternal substance abuse may be more salient and strongly associated with emotion socialization specifically during periods of use, when both behaviors are more closely linked in time. Testing this supplemental hypothesis involved estimating similar regression models from the original analyses for hypothesis 4, but employing emotion socialization behaviors during periods of drug use as the outcome variable. Results for

the three models are presented in Table 10. Maternal substance abuse factors did not predict variability in supportive reactions during periods of drug use (model 1). However, greater impairment as indicated by more abuse/dependence criteria was associated with more non-supportive reactions during periods of drug use ($\beta = 0.19$, $p = .02$; model 2). Additionally, consistent with results from the primary analyses, longer periods of abstinence was associated with less consistent reactions during periods of drug use ($\beta = -0.10$, $p = .001$; model 3).

Hypothesis 5

It was hypothesized that indicators of parent emotion socialization (supportive reactions, non-supportive reactions, and consistency of reactions) mediate relations between maternal substance abuse factors (lifetime history of regular substance use, length of current period of abstinence, number of abuse/dependence criteria met, and postnatal exposure) and children's emotion regulation (see Figure 1). Prenatal drug exposure was expected to have only a direct effect on children's emotion regulation. It was expected that the mediated effects would emerge even when related variables that have been implicated in this mechanism are included in the model (i.e., maternal psychopathology, maternal emotion regulation).

Model Building Strategy

In addition to the regression analyses completed above for hypothesis 4 (testing the effects of maternal substance abuse on emotion socialization; pathway *a*), additional hierarchical multiple linear regression analyses were completed as the first model building step to test relations among variables. Results from these regression analyses (in combination with those from hypothesis 4) determined which variables were appropriate to include in the full structural equation model. The goal of this model building strategy was to test relations across predictors, the mediator, and the outcome, in order to simplify the number of variables entered into the final

structural equation model. The first regression model tested the effects of maternal substance abuse on child emotion regulation (pathway *c*) and included the same control variables and covariates in the first and second steps, and the four maternal substance abuse factors in the third step, to predict child emotion regulation. Negative parenting style (β = -0.56, *p* = .02), child psychopathology (β = -0.07, *p* = .0001), and environmental stressors (β = 0.15, *p* = .01) were all significant predictors of child emotion regulation. However, none of the maternal substance abuse factors predicted child emotion regulation. Although the direct effects of maternal substance abuse on child emotion regulation (pathway *c*) were non-significant, mediation is possible even when direct relations between the predictor and outcome are not significant (MacKinnon & Fairchild, 2009), suggesting continued probing was necessary.

Thus, the second set of model building regression analyses tested the effects of emotion socialization on child emotion regulation (pathway *b*) and included the same control variables and covariates in the first and second steps, and the three emotion socialization indicators in the third step, to predict child emotion regulation. The first model tested the effects of typical emotion socialization behaviors that were not context specific (consistent with primary analyses), with results showing that emotion socialization behaviors did not predict emotion regulation. The second model tested the effects of emotion socialization behaviors specifically during periods of drug use (consistent with sensitivity analyses), with results showing a marginally significant effect of non-supportive reactions predicting poorer emotion regulation (β = -0.14, *p* = .07). In sum, non-supportive reactions during periods of drug use were the only significant emotion socialization predictors of child emotion regulation. Additional covariates that predicted emotion regulation included negative parenting (marginal in the first model β = -0.43, *p* = .095, and significant in the second model β = -0.50, *p* = .04), child psychopathology (significant in both the

first β = -0.06, *p* = .0007, and second model β = -0.07, *p* = .0001), and environmental stressors (marginal in the first model β = 0.12, *p* = .05, and significant in the second model β = 0.16, *p* = .005). Any predictor variables that did not significantly explain variance in emotion regulation or emotion socialization across model building regression analyses were trimmed from further analyses. Pooling across the series of model building regression analyses, the remaining variables to test in the mediation model included the direct effects of negative parenting, child psychopathology, and environmental stressors on emotion regulation, and the indirect effect of abuse/dependence criteria on emotion regulation via non-supportive reactions to children's emotions during periods of drug use.

Structural Equation Modeling

A structural equation modeling (SEM) framework was employed to test the hypothesis that non-supportive emotion socialization during periods of drug use mediates the relationship between maternal substance abuse (abuse/dependence criteria) and children's emotion regulation. The SEM framework allows for direct and indirect effects to be estimated simultaneously. The SEM was estimated using Maximum Likelihood with robust standard errors in M*Plus* version 5.2 (Muthén & Muthén, 1998). Consistent with the prior confirmatory factor analysis, non-supportive reactions to children's emotions was estimated as a latent factor with four indicators (the four non-supportive subscale testlets). The mediation model included the direct effects of abuse/dependence criteria, negative parenting, child psychopathology, and environmental stressors on emotion regulation, and the indirect effect of abuse/dependence criteria on emotion regulation via non-supportive reactions to children's emotions during periods of drug use. SEM results are presented in Figure 6. Tests of model fit indicate acceptable fit of the SEM to the data (χ^2 (20) = 37.93, *p*= .009; RMSEA= 0.11, 90% CI: 0.054-0.163; CFI=0.92,

TLI=0.87). All modification indices resulting from the analysis were extremely small, and thus no model changes were made. The direct effects of child psychopathology (β = -0.43, p = 0.000) and environmental stressors (β = 0.31, p = 0.001) were significant predictors of emotion regulation, indicating that children with greater psychopathology exhibit poorer emotion regulation, whereas higher levels of environmental stressors predicted greater emotion regulation. The direct effects of negative parenting style (β = -0.21, p =.11) and abuse/dependence criteria (β = -0.01, p =.91) on emotion regulation were non-significant.[2] The specific indirect effect of abuse/dependence criteria on child emotion regulation via non-supportive reactions was significant (β = -0.09, p = .049), indicating that non-supportive emotion socialization mediates the relationship between maternal substance abuse and child emotion regulation. Specifically, more significant impairment related to maternal drug use predicted greater non-supportive reactions which, in turn, predicted poorer child emotion regulation.[3]

[2] As noted previously, although the direct effect of abuse/dependence on emotion regulation was non-significant, it is possible for this direct pathway (relations between the predictor and outcome variable) to be non-significant even when there is mediation present (MacKinnon & Fairchild, 2009).

[3] Following the mediation effect found in the parent-driven model for hypothesis 5, a sensitivity analysis estimated an equivalent child-driven model testing if non-supportive emotion socialization during periods of drug use mediates the relationship between child emotion regulation and abuse/dependence criteria, controlling for the direct effects of child emotion regulation, negative parenting, child psychopathology, and environmental stressors on abuse/dependence criteria. The child-driven model showed acceptable fit (χ^2 (20) = 36.67, p= .01; RMSEA= 0.11, 90% CI: 0.048-0.16; CFI=0.91, TLI=0.87). All modification indices resulting from the analysis were extremely small, and thus no model changes were made. The direct effects of child emotion regulation, negative parenting, and child psychopathology on abuse/dependence criteria were non-significant; the direct effect of environmental stressors on abuse/dependence criteria was significant (β = 0.31, p = .009). The specific indirect effect of child emotion regulation on maternal abuse/dependence criteria via non-supportive emotion socialization was significant (β = -0.09, p = .044). The child-driven and parent-driven equivalent models fit the data equally well.

CHAPTER 4: DISCUSSION

The current study examined emotion socialization behaviors among mothers in addiction treatment and explored risk mechanisms that may explain emotion regulation deficits in their children. On average, mothers reported engaging in "emotion coaching" styles of socialization involving more consistent and supportive reactions and fewer non-supportive reactions to children's emotions, consistent with general population studies. Moreover, mothers endorsed a supportive style of emotion socialization behaviors across contexts of drug use and sobriety. However, the context of drug use did impact how well mothers balanced these types of reactions, with findings showing more non-supportive behaviors while using than while sober, and more consistent and supportive behaviors while sober than while using. Additionally, greater severity of maternal substance abuse predicted more non-supportive socialization behaviors during periods of use, but predicted more consistent behaviors at the time of the interview. Variability within this group of substance-abusing mothers was explored in order to evaluate *who* is at risk (i.e., those with greater severity of drug use) and *when* they are at risk (i.e., while using) for engaging in less effective emotion socialization behaviors. Findings support a mediated risk mechanism such that more severe impairment related to maternal substance use predicted higher levels of non-supportive reactions to children during periods of use, which in turn predicted poorer child emotion regulation.

Measurement of Emotion Socialization among Substance-abusing Mothers

A primary goal of the current study was to determine if the construct of emotion socialization could be captured in a sample of mothers seeking addiction treatment. It was

anticipated that substance-abusing mothers would employ similar strategies in reacting to their children's negative emotions and that these types of reactions would relate to one another as they do in the emotion socialization literature (Gottman, Katz, & Hooven, 1997). This hypothesis was generally supported, with results of the current study confirming that it is possible to reliably and validly measure emotion socialization within this sample, and that the supportive and non-supportive emotion socialization factors clearly emerged within this population as described in the literature (Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002; Gottman, Katz, & Hooven, 1997). Thus, emotion socialization behaviors among substance-abusing mothers can be characterized along the dimensions of "emotion coaching" and "emotion dismissing," similar to the general population. Additionally, consistent with the extant literature, emotion socialization was strongly related to parenting style more generally (e.g., Chan, Bowes, & Wyver, 2009; Katz, Wilson, & Gottman, 1999), but was also a unique predictor of child emotion regulation as others have found (Gottman, Katz, & Hooven, 1997), highlighting that emotion socialization involves a unique set of parenting practices among substance-abusing mothers as well.

However, two key differences emerged in the current sample with respect to the construct of emotion socialization. First, substance-abusing mothers engaged in two unique kinds of distress reactions—distress externalized toward the child and distress internalized inward—whereas in the general population the distress reaction items comprise one factor. This distinction may be especially important for substance-abusing mothers. Patterns of externalizing and internalizing distress reactions followed different trends across periods of drug use and sobriety in the current sample, whereas such reactions may appear more constant or global for non-using mothers. Specifically, mothers' externalized distress reactions were much lower at the time of the interview and during periods of sobriety, but increased during periods of use;

however, internalized distress reactions remained relatively high and stable across all three contexts (see Table 8), suggesting that mothers appear equally impacted in terms of how internally distressed they become in response their children's expression of negative emotion, regardless of whether or not they are using. Furthermore, internalized distress remained the highest non-supportive reaction across all three contexts, particularly during periods of sobriety, suggesting that overall mothers are more likely to internalize their children's distress. This pattern of stable internalized distress may reflect feelings of guilt, shame, or self-blame that are common experiences for substance-abusing mothers (Ehrmin, 2001).

Second, the inclusion of the consistency items emerged as a unique component of emotion socialization behavior. Consistency of reactions fell along the supportive emotion socialization dimension, indicating that predictability and consistency in responses to children's negative emotions characterize positive and supportive traits of emotion socialization. These findings highlight the importance of evaluating not only styles of reactions to children's emotions, but the degree of consistency in reactions. It is especially important to explore consistency of reactions among substance-abusing samples given the known impact that general parenting inconsistency can have on child outcomes in these families (e.g., Velez, Jansson, Montoya, Schweitzer, Golden, & Svikis, 2004).

Although the construct of emotion socialization in the current sample parallels findings in the general population overall, the original Coping with Children's Negative Emotions Scale (CCNES) required significant modifications in the current sample. Only 44 of the original 72 items functioned well in this sample, with 16 items showing too little variance and 12 items loading poorly onto the specific factors established in the literature. Furthermore, the emotion-focused and problem-focused subscales were particularly problematic, requiring that a large

majority of items be dropped due to ceiling effects (high endorsement rates, significantly skewed responses, and poor variance). The fact that many items functioned poorly could be due to characteristics of this sample of mothers in addiction treatment; however, there are no known reports that explore the CCNES at the item-level to evaluate which items function adequately in other samples. Researchers who developed the CCNES have explored combining subscales differently based on principal components analysis indicating that there may be four scales, including supportive (mean of emotion-focused and problem-focused), non-supportive (mean of minimization and punitive), and independent scales for expressive encouragement and distress reactions (Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002). However, the large majority of published articles employing the CCNES do not report conducting factor analysis to explore the true structure of the measure.[4] More research is needed to establish psychometric properties of the CCNES in at-risk samples but also in general population samples. Results from the current study suggest that more nuanced scenarios and response options may pull for increased response variability.

Characteristics of Emotion Socialization among Substance-abusing Mothers

This was the first reported study to characterize emotion socialization behaviors among a sample of substance-abusing mothers. The context of recovery provides a unique opportunity to explore emotion socialization behaviors among mothers who are attempting to change deeply ingrained patterns that for some may have involved using drugs to cope with negative emotions

[4] 36 studies that used the original CCNES were found in PsycINFO by entering the search term "Coping with Children's Negative Emotions Scale" in the Tests & Measures section or anywhere in the text. Of those identified, 15 simply used the CCNES as originally intended, 4 followed the principal components analysis results from Fabes et al. (2002) recommending the use of 4 subscales, while 12 used a different combination of the original 6 subscales to form supportive and non-supportive scores (e.g., employing only 2 of the 3 supportive scales) or created a unique score without demonstrating empirical support for doing so; in all of these reports the factor structure of the CCNES was not evaluated. Only 5 explored the structure of the scale, either by completing a principal components analysis (n=2), or an exploratory / confirmatory factor analysis (n=3), with factors generally falling along the proposed dimensions.

themselves (self-medication; Khantzian, 1997). Because of the stressful context of recovery and risk of relapse, it was expected that mothers' emotion socialization behaviors would be characterized as emotion dismissing, engaging in more non-supportive reactions and fewer supportive reactions. Contrary to hypotheses, results indicated that on average mothers were in fact emotion-coaching, engaging in more consistent and supportive reactions and fewer non-supportive reactions, similar to general population samples. This was true across all three contexts: typical reactions at the time of the interview, during periods of use, and during periods of sobriety. Despite research showing that more general parenting practices among substance-abusing mothers are more unsupportive and inconsistent (e.g., Solis, Shadur, Burns, & Hussong, in press) in combination with the challenges associated with recovery and relapse (Scott, Foss, & Dennis, 2005), mothers in the current study still reported being supportive when their children express negative emotions.

Although mothers reported more consistent and supportive reactions when asked about examples of children showing specific emotions that were identified for the respondent in the item prompts (e.g., "If my child becomes angry…"), one limitation of the CCNES measure is that it assumes that mothers can *recognize* emotions in their children. In addition to the way in which mothers react to children's emotions, an important component of emotion-coaching behavior more broadly involves awareness of children's emotions (Eisenberg, Cumberland, & Spinrad, 1998; Gottman, Katz, & Hooven, 1997). This may be a particular area in which substance-abusing mothers struggle. Although awareness of children's emotions was not evaluated specifically in the current study, individuals with substance and alcohol use disorders often exhibit difficulties with recognizing, labeling, and general awareness of emotions within themselves and in others (Carton, Bayard, Paget, Jouanne, Varescon, Edel, et al., 2010), and

mothers in the current study showed poorer emotional acceptance, awareness, and clarity regarding their own emotions compared to a community sample of women (Difficulties with Emotion Regulation Scale; Gratz & Roemer, 2004).

One participant in the current study articulated this core deficit within the context of recovery quite nicely when she stated that she was just beginning to recognize and feel her own emotions after being "numbed" by years of drug use. Another participant described a process of discovering emotional acceptance within herself and her child: "I don't like to show my emotions – I'm still having trouble figuring that out—so I don't know how to respond when *he* shows emotion." In the context of long substance abuse histories for many mothers and potentially spending years using drugs as a means to numb or avoid negative emotions, mothers may experience re-emergence of their own emotions and may be re-learning to recognize and manage their own emotional experiences. Yet they are also faced with the task of bolstering their children's emotional awareness and regulation at a critical period in early development when extrinsic support for these processes is key for young children (Calkins & Hill, 2007). Due to these challenges, it may be that substance-abusing mothers indeed respond supportively to their children, but struggle to adequately match their responses to their children's distress in a way that is contingently responsive to their children's specific emotional cues (Bernard, Dozier, Bick, Lewis-Morrarty, Lindhiem, & Carlson, 2012).

In an effort to further explore how emotion socialization behaviors may be uniquely different among these women, the current study compared emotion socialization practices that characterize substance-abusing mothers to those that characterize mothers more generally. It was expected that substance-abusing mothers would engage in fewer positive emotion socialization behaviors compared to a control group of mothers. Although both groups of mothers can be

characterized as emotion coaching overall, mothers in the current sample engaged in significantly higher levels of supportive *and* non-supportive reactions compared to the control group. These findings could suggest that substance-abusing mothers' reactions to children's emotions tend to be more extreme—whether positive or negative in nature; these effects could also represent a stronger reporting bias among substance-abusing mothers. Additionally, this pattern may indicate some degree of over-involvement in emotion socialization behaviors among substance-abusing mothers, which has been shown to predict increased risk for self-medication in adolescents (Hersh & Hussong, 2009), thus serving as a potential early risk marker for young COSs. However, maternal substance abuse cannot be isolated from other contextual risk factors that may vary between the current sample and comparison group of mothers. Thus, the differences in emotion socialization across samples could arise due to maternal drug use or potentially alternative mechanisms of risk that may drive the effect. Substance-abusing mothers are also more likely to have children with more dysregulated behaviors (Eiden, Edwards, & Leonard, 2004; Eiden, Lewis, Croff, & Young, 2002), which may pull for unique emotion-based responses from mothers.

The Impact of Maternal Substance Abuse on Emotion Socialization Practices

For most individuals with severe substance use disorders, the process of recovery involves chronic cycling through periods of sobriety, relapse, and seeking treatment (Scott, Foss, & Dennis, 2005), with each step of the cycle encompassing a new set of challenges. In the current sample of mothers engaged in addiction treatment, 24% (n=18) were in a period of active drug use and an additional 24% (n=18) had been clean for 30 days or less. Overall, mothers had been clean for an average of only four months, and mothers' drug use during their children's lives show frequent relapse. This raises the question of how maternal substance use impacts the

way in which mothers respond to their children's negative emotions. Despite remaining emotion coaching overall and across contexts, drug use did impact how well mothers balanced their reactions to children's emotions. Differences were observed within mothers as a function of periods of drug use, with more non-supportive and less consistent behaviors while using than while sober. Differences were also observed across mothers based on their overall history, with greater severity of drug use during the child's lifetime predicting more non-supportive socialization behaviors during periods of drug use. Together these findings reveal *who* is at risk (i.e., those with greater severity of drug use) and *when* they are at risk (i.e., while using) for engaging in increased negative emotion socialization behaviors. This indicates that ultimately all substance-involved mothers may be at greater risk of engaging in more non-supportive reactions while using, but the mothers with more severe and problematic use are at even further increased risk of engaging in non-supportive reactions during those periods of drug use.

There are a number of plausible explanations for why maternal drug use is associated with increased rates of non-supportive and less consistent reactions to children's emotions. Periods of drug involvement are characterized by frequent fluctuation between being under the influence and being in withdrawal, leading to increased emotional lability, irritability, low inhibition, and poor distress tolerance (Richards, Daughters, Bornovalova, Brown, & Lejuez, 2011; Simons, Oliver, Gaher, Ebel, & Brummels, 2005). As such, mothers' own emotional control and self-regulation become increasingly compromised during periods of drug use, making it more difficult for mothers to respond supportively and consistently to their children's emotional needs (Kerwin, 2005; Velez & Jansson, 2008). Thus, the emotional volatility and lack of self-regulation among substance-using mothers could explain why substance use is associated with an increase in non-supportive reactions to children's emotions.

The relationship between maternal substance abuse and emotion socialization could also be explained by research showing that substance-abusing mothers not only experience greater stress associated with parenting young children compared to non-using mothers (Kelley, 1992), but also have more difficulty coping with this increased maternal distress (Sheinkopf, Lester, LaGasse, Seifer, Bauer, Shankaran, et al., 2006). This may be especially true for mothers in recovery who are unable to use past coping strategies that primarily involved the use of substances (SAMHSA, 2012). Moreover, for mothers in addiction treatment, the increased level of distress related to mothering subsequently compromises their parenting abilities, as indicated by more aggressive and neglectful parenting, including parental withdrawal (Suchman & Luthar, 2001). This research suggests that increased distress related to the mothering role could also negatively impact emotion socialization behaviors within this sample. Additionally, although distress specific to the mothering role was not evaluated in the current study, mothers' externalized distress reactions to their children's emotions were higher during periods of use and lower during periods of sobriety, suggesting that the context of drug use increases mothers' vulnerability to a distress response.

The context of active drug use is also often defined by a more chaotic, unpredictable, and unstable lifestyle and caregiving environment more generally (e.g., Barnard & McKeganey, 2004; Gruber & Taylor, 2006; Stanley, Cleaver, & Hart, 2010). In these cases, less supportive and less consistent emotion socialization may be a byproduct of a more generally compromised context and lifestyle. An important question addressed by the current study is the extent to which severity of maternal substance abuse uniquely explains variability in emotion socialization behaviors, above and beyond the environmental risk factors and stressors that often comprise the environment in which COSs grow up. Some work has indicated that among substance-abusing

mothers, those who experience greater environmental risk factors are more likely to engage in maladaptive parenting behaviors (Nair, Schuler, Black, Kettinger, & Harrington, 2003). Among non-substance using mothers, greater contextual risk factors predict poorer emotion socialization behaviors, and furthermore, such non-supportive emotion socialization behaviors mediate the relationship between contextual risk/stress and children's emotion regulation (Shaffer, Suveg, Thomassin, & Bradbury, 2012). Although mothers in the current study reported significantly more environmental stressors (e.g., trauma, violence, legal problems, poverty, and psychological distress) while using than while sober, these factors were controlled for and did *not* predict emotion socialization behaviors. This finding lends support for the conclusion that there is a unique effect of maternal substance use on maternal emotion socialization. However, future work should consider the possible interaction between environmental stressors and maternal substance use. For example, the combination of problematic drug use within the context of increased environmental stressors may set mothers up to engage in increasingly non-supportive emotion socialization behaviors.

Differences in emotion socialization behaviors across contexts of use and sobriety may also reflect mothers' attempts to self-correct previously problematic parenting behaviors. Given that greater severity of use predicted more non-supportive reactions only during the same periods of problem drug use, but prospectively predicted more consistency in reactions at the time of the interview, one possible explanation is that mothers may have been compensating for past histories of impairment and non-supportive emotion socialization by increasing consistency in reactions in the present. Experiences of guilt related to previous parenting behaviors could thus motivate mothers to change their parenting approach once in treatment. Indeed, substance-abusing mothers are often plagued by deep feelings of guilt and shame around how periods of

active substance use impaired their parenting abilities (Ehrmin, 2001). Although extreme guilt and shame deter some mothers from seeking treatment (Ehrmin), others have indicated that the experience of guilt around motherhood motivates substance dependent women to initiate treatment in order to protect children from additional harm and to be a better mother, or with hopes of regaining custody for those who have lost their children (Marsh & Cao, 2005; SAMHSA, 2012). Early parenthood provides a unique opportunity for renewed commit to recovery and treatment (Söderström & Skårderud, 2009), and guilt can thus serve as a motivator for making improved parenting choices once in recovery.

Additionally, the association between more problematic drug use in the past and more consistent emotion socialization behaviors at the time of the interview could reflect the possibility that mothers with more severe and impairing substance abuse histories may be more likely to receive intensive addiction treatment services. Indeed, in the current sample, mothers in residential treatment programs (the most intense treatment service) reported longer periods of use during their child's lifetime and also experienced significantly more impairment compared to mothers receiving outpatient treatment (Table 3). The increased consistency, routine, and structure that comes from treatment compliance and attendance (especially for those in residential care) could extend to the parenting domain more generally, which may partially explain increased consistency in parenting behaviors at the time of the interview. Addiction treatment services also often include parenting classes for pregnant women or mothers with young children (SAMHSA, 2009a) which may be more strongly indicated for those with more severe substance abuse histories. Indeed, mothers in the current sample who had been enrolled in parenting classes (62%) had significantly more impairment related to substance use during periods of use ($t(72)=-2.50$, $p=.01$) compared to those who had never received parenting classes,

yet both groups were equally consistent in emotion socialization behaviors at the time of the interview. These effects suggest that the relationship between more severe impairment related to drug use and subsequently more consistency in emotion socialization reactions at the time of the interview could be partially explained by more intensive addiction treatment (i.e., residential care) in combination with parenting classes.

Contrary to expectations, longer periods of successful abstinence predicted *less* consistency in reactions to children's emotions. This finding could reflect the possibility that engaging in positive and supportive parenting behaviors takes significant effort, energy, and thought, all of which are internal resources that may be inconsistently available to mothers in recovery. The emergence of positive behaviors during periods of sobriety may be inconsistent, whereas negative parenting during periods of use can appear consistent due to emotional unavailability, parental absence from the parent-child relationship, or neglect (e.g., Söderström & Skårderud, 2009; Wilson, Beckmann, & Nunes, 2007). This process can be described as an overall consistent lack of focus on the child during periods of use, which may help explain why less successful abstinence was associated with more consistent emotion socialization behaviors.

A critical contribution of the current study is the finding that emotion socialization behaviors do indeed vary as a function of drug use and across contexts, despite being described in the literature as a generally stable trait of parenting (Gottman, Katz, and Hooven, 1997). This highlights the importance of considering the context in which emotion socialization behaviors are observed and exploring variability in such behaviors within other populations as well. This is the first reported study aiming to explore variability and inconsistency in how mothers socialize children around emotion, and thus it is unclear if substance-abusing mothers may be more easily influenced by the impact of context that leads to increased variability in emotion socialization.

However, there may be factors other than the context of substance use that could predict changes in the ways mothers react to their children in the general population (e.g. separation, divorce, financial burden/job loss).

Mechanisms Explaining Emotion Regulation Deficits among Children of Substance - Abusing Mothers

Consistent with proposed hypotheses, non-supportive emotion socialization behaviors mediated the relationship between the severity of maternal substance use and child emotion regulation. This risk mechanism helps explain why children of substance-abusing mothers exhibit emotion regulation deficits, such that more significant impairment related to maternal substance use predicts higher levels of non-supportive reactions while using, which, in turn, predicts poorer emotion regulation in children. Specifically, non-supportive reactions to children's emotions were the only emotion socialization behaviors that uniquely predicted poorer emotion regulation in the current study, which is contrary to findings from community samples (e.g., Morris, Silk, Steinberg, Myers, & Robinson, 2007) and other at-risk samples (e.g., Brophy-Herb, Stansbury, Bocknek, Horodynski, 2011; Shipman, Schneider, Fitzgerald, Sims, Swisher, & Edwards, 2007) showing that both supportive and non-supportive reactions to children's emotions uniquely predict emotion regulation. This indicates that the presence of positive emotion socialization behaviors may not be critical for supporting children's emotion regulation in substance-involved populations, and in fact the negative effect of non-supportive reactions is more detrimental than a lack of supportive reactions in these families. Indeed, negative emotion socialization behaviors in particular may increase children's level of emotional arousal, thus compromising their ability to develop appropriate emotion regulation skills in the context of heightened affect (Garner & Estep, 2001) and possibly leading to emotional insecurity in the home (Eisenberg, Liew, & Pidada, 2001). This pattern of results suggests that intervention

programs aimed at supporting emotion regulation development among young COSs should encourage mothers *not* to engage in non-supportive reactions, even, perhaps, at the expense of limiting supportive reactions as well.

Results from the current study are consistent with findings that explore other indices of emotion socialization in general population studies, including the effects of emotional expressiveness in the home. Negative, but not positive, emotional expressiveness in the family is particularly important for mechanisms explaining child outcomes related to compromised emotion regulation (Eisenberg, Liew, & Pidada, 2001; Ramsden & Hubbard, 2002). Moreover, negative dominant (e.g., anger, hostility) and negative submissive (e.g., crying, sadness) emotional expressiveness are both uniquely associated with compromised emotion regulation in children (Eisenberg, Liew, Pidada, 2001). The conclusion that negative emotion socialization may be particularly toxic also parallels findings from family systems and couples literature indicating that negative expressed emotion in families and within couples is uniquely problematic for adaptive and healthy child and relationship outcomes (e.g., criticism and hostility predict increased symptoms for children with mood disorders: Kim & Miklowitz, 2004; Miklowitz, 2007; criticism and contempt predict increased individual and relational distress: Epstein & Baucom, 2002). Negative expressed emotions may be particularly damaging because they threaten individuals' psychological well-being in addition to interpersonal relationships (Epstein & Baucom). A similar insult to the mother-child relationship within the context of maternal substance use may explain the uniquely harmful effects of non-supportive reactions to children's emotions.

The effect of non-supportive reactions on children's emotion regulation warrants further exploration. Future research should consider possible interactions between styles of emotion

socialization, as some work with community samples shows that supportive emotion socialization does not directly impact child emotion regulation but rather buffers the negative effect of non-supportive emotion socialization on child emotion regulation (Lunkenheimer et al., 2007). This possibility should be explored among substance-abusing samples as well. Additionally, emotion socialization behaviors across various caregivers may interact to predict child emotion regulation. For example, secure attachment with a non-using parent can buffer the effect of parental alcohol use on child behavior (Eiden, Edwards, & Leonard, 2002), suggesting that a similar pattern could unfold with regard to parent emotion socialization.

Strengths, Limitations, and Future Directions

This study is the first to characterize emotion socialization among substance-abusing mothers and test mechanisms explaining relations between maternal substance abuse and child emotion regulation via maternal emotion socialization behaviors. Strengths of the current study include a multi-site design with data from a variety of treatment programs and an ethnically diverse sample, yielding increased generalizability of the results. Additionally, consistency of reactions to children's emotions was explored as a novel component of emotion socialization.

However, the cross-sectional nature of the data limits the extent to which mechanisms of risk and direction of effects can be truly explored. Because mediation assumes that the independent variable (maternal substance abuse) causes the mediator (emotion socialization) which causes the dependent variable (emotion regulation), true tests of mediation can only emerge from longitudinal studies that capture each construct at multiple time points, thus establishing temporal precedence (Baron & Kenny, 1986; Masten, Roisman, Long, Burt, Obradović, Riley, et al., 2005). A prospective longitudinal design would be ideal for testing this model, particularly with regard to the plausible bidirectional nature of effects (i.e., parent-driven

versus child-driven models). Nonetheless, testing for concurrent mediation is a significant first step given the cross-sectional nature of these data. Results from the current study support concurrent mediation, suggesting the possibility of true mediation, thus informing future research efforts aimed at evaluating this effect in a longitudinal design framework.

Additional limitations of the current study must be noted. All constructs were assessed via mother-report only, presenting the possibility of shared method variance and reporter bias. The study design also raises concerns regarding mothers' ability to retrospectively report on periods of their lives, particularly during which they were involved in significant and impairing substance use. An experience sampling methodology would allow for more objective and in-vivo measures of key constructs and their relations, including daily measures of maternal substance use and emotion socialization behaviors to test for within-person effects. This type of approach would more effectively discriminate between emotion socialization behaviors that coincide with being actively under the influence, in withdrawal, or sober. Experience sampling methods could also offer more precise measurement of consistency of reactions by evaluating discrepancy scores across repeated measures of maternal reactions to children's emotions within a short time frame.

A multi-method multi-reporter strategy is indicated to capture the constructs of interest, particularly given the ambiguity in the field with regard to how emotion regulation is defined and measured (Thompson & Goodman, 2010). Additional research is certainly needed to further refine the construct of emotion regulation. Capturing emotion regulation across multiple levels of analysis will support this effort, including physiological, behavioral, and observational measures. It will also be important to test if emotion socialization behaviors impact emotion regulation at a physiological level among children of substance-abusing parents, as has been shown in

community samples (Gottman, Katz, and Hooven, 1997). Future work should also consider additional indices of parent emotion socialization among substance-abusing parents, including the way in which parents model their own emotion regulation, emotional expressiveness, parental awareness and acceptance of emotions, and the discussions that parents have with children regarding emotion (Eisenberg, Cumberland, & Spinrad, 1998; Gottman, Katz, & Hooven, 1997), as well as exploring variability in emotion socialization behaviors between substance-abusing mothers and fathers.

A critical next step will involve exploring the possible transactional nature of the effects found in the current study. Processes involving maternal drug use, emotion socialization, and emotion regulation are likely bidirectional in nature within child-parent dyads. Primary mediation hypotheses explored a parent-driven model where parenting behaviors (drug use, emotion socialization) predicted child behaviors (emotion regulation). However, it has long been established that child behavior also impacts parental behavior (Beeghly & Tronick, 1994; Belsky, Lerner, & Spanier, 1984; Sameroff, 1975). Indeed, in the current study, the children-driven model indicated that the effect of child emotion regulation on maternal abuse/dependence was mediated via non-supportive reactions. Although these data do not allow for a proper test of these processes over time, the findings suggest that a bidirectional process may explain the relationship between maternal substance use and child emotion regulation. However, it must also be noted that mothers in the current study have long substance abuse histories (10 years on average), and thus in many cases these processes were in place before children were born. It may be that shorter time frame relations reflect child-driven effects, such that within a given day or week, higher levels of problem child behavior and emotional dysregulation may lead mothers to respond more negatively to their children and subsequently relapse or increase their drug use,

possibly due to increased frustration or guilt. The longer time frame effects are more likely driven by maternal substance use behavior that was firmly established long before motherhood. Research exploring longitudinal effects related to parent emotion socialization suggests that socialization behaviors predict child outcomes over time, including child emotion regulation (community sample; Gottman, Katz, and Hooven, 1997) and internalizing symptoms (depressed mothers; Silk et al., 2011).

Ultimately, mechanisms of risk explaining emotion regulation deficits among young children of substance-abusing parents will be most effectively explored within a developmental science perspective (Cairns, Elder, & Costello, 1996) that considers how these factors interact across multiple levels of analysis (e.g., genetic, neurobiological, behavioral, dyadic, environmental) and over time. COSs are more likely to suffer from the compounded effect of both genetic and environmental risk for compromised emotion regulation, with more stressful and unpredictable environments that increase arousal and compromise the development of emotion regulation (Söderström & Skårderud, 2009), combined with a biological predisposition for dysregulation making it more challenging to combat increased environmental risk (Thompson, Lewis, & Calkins, 2008). Teasing apart the two influences of biological and environmental risk becomes increasingly challenging: COSs are more emotionally reactive and more easily aroused (e.g., Schuetze, Molnar, & Eiden, 2012) which means a greater delta to return to baseline, requiring greater emotion regulation efforts than children who are less reactive, yet COSs on average will have poorer emotion regulation strategies to counteract elevated reactivity.

When the focus shifts to emotion socialization practices, it must be acknowledged that children who are more reactive and less regulated will solicit more frequent reactions from

mothers. If maternal reactions are more supportive than not, as found in current study, then this circumstance may be one in which the environment may actually buffer the genetic risk; however, for children with non-supportive mothers, the biological risk (i.e., greater reactivity, poorer regulation) may be further exacerbated by the environmental risk (increased stressors, non-supportive emotion socialization). The possible interaction between genetic and environmental risk warrants further exploration of both between-person and within-person mechanisms that explain relations between maternal substance use, emotion socialization, and child emotion regulation in these families.

Conclusions and Implications

The current study addresses several gaps in the literature by assessing emotion socialization in a sample of substance-abusing mothers, demonstrating that overall, mothers engage in emotion-coaching behaviors that are more supportive and consistent, and less non-supportive. Despite reacting to children more positively across all contexts, mothers balance these types of reactions less effectively during periods of drug use. It is thus most useful to establish *who* is at risk (i.e., mothers with more problematic drug use) and *when* they are at risk (i.e., while using) for engaging in poorer emotion socialization behaviors, rather than characterizing this population of mothers overall. Findings also indicate that non-supportive reactions to children's emotions are particularly problematic for child emotion regulation, highlighting that negative emotion socialization is a uniquely salient predictor of emotion-related child outcomes. Moreover, the relationship between more problematic substance involvement and poorer emotion regulation in children was explained by non-supportive reactions to children's emotions specifically during periods of maternal drug use.

Collectively, these findings can inform the development of treatment programs by identifying non-supportive emotion socialization behaviors as an early target for intervention and prevention efforts focused on supporting children's emotion regulation within contexts of maternal drug use. The primary treatment goal would involve helping mothers decrease their non-supportive reactions to children's emotions. Programs targeting parent emotion socialization practices suggest that socialization behaviors are indeed amendable in response to intervention (Havighurst, Wilson, Harley, & Prior, 2009). Given that maternal substance use disorder (abuse/dependence) was a strong predictor of non-supportive emotion socialization behaviors, addiction treatment services aimed at minimizing consequences and impairment related to drug use would also indirectly support children's emotion regulation.

The risk mechanism in the current study begs the question of how these early developmental processes involving maternal drug use, emotion socialization, and child emotion regulation may be related to intergenerational transmission of persistent emotion regulation deficits and risk for later substance use in adolescence and into adulthood. Findings from the current study can be couched within the framework of the internalizing pathway to substance use disorders which defines emotion dysregulation as the core deficit across development (Hussong, Jones, Stein, Baucom, & Boeding, 2011). Early predictors of compromised emotion regulation in young COSs are thus likely to have important implications for developmental outcomes related to addiction, and point to non-supportive emotion socialization behaviors within the context of maternal substance use as an early risk marker. Parent emotion socialization behaviors continue to impact child risk through adolescence, with overinvolved emotion socialization behaviors (high on emotion-coaching *and* emotion-dismissing) predicting greater risk for self-medication in youth (Hersh & Hussong, 2009). This risk may be even further exacerbated for children of

substance-abusing parents who may lack support for emotion regulation development from an early age, priming them as adolescents to seek alternative methods for coping when distressed (i.e., self-medication), but as youth they may face even further increased risk if their parents also model self-medication as a way to cope with negative affect. This pattern of results indicates that fostering healthy emotion regulation development among young children of substance-abusing parents may buffer this risk. Although more research is needed to fully elucidate the mediating mechanisms explaining emotion regulation deficits in these young children, non-supportive maternal emotion socialization appears to be one key factor.

Table 1.

Descriptions of General Population Samples Included in the Aggregate Mean for Hypothesis 1

Article	N	Gender	Age	Ethnicity	Region & SES	CCNES Reporter	Mean CCNES scores M (*SD*)
Baker, Fenning, & Crnic (2011)	N= 88	42% female	8-year-olds	67% Caucasian, 17% Hispanic, 9% African American, 5% Asian, 2% "Other"	25% rural/suburban central PA; 75% Los Angeles; Mean annual family income $50,000-70,000	Mothers	Supportive= 5.2 (0.74) Non-supportive= 2.43 (0.60)
Davidov & Grusec (2006)*	N= 105	50% female	Mean= 7 years old; Range= 6-8-year-olds	84% Anglo-European / European, 6% South-East Asian, 5% Asian, 5% "Other"	"Middle class SES"	Mothers	Supportive= 5.68 (0.56) Non-supportive= 2.30 (0.58)
Davis & Buss (2012)	N= 79	44% female	Mean= 6 years, 2 months old; Range= 5.5-6.75 year-olds	97% European-American, non-Hispanic, 1.5% Hispanic, 1.5% Asian-American	Predominantly middle class	86% mothers	Supportive= 5.48 (0.62) Non-supportive= 2.62 (0.58)
George, Cummings, & Davies (2010)*	N= 234	55% female	Mean= 6 years old; Range= 5-8-year-olds	71% Caucasian, 15% African American, 14% "Other"	Northeast metropolitan area and small Midwest city; Mean annual family income $40,000-54,999; community sample	Mothers	Supportive = 5.60 (0.66) Non-supportive= 2.58 (0.61)
Nelson, O'Brien, Blankson, Calkins, & Keane (2009)	N= 101	48% female	7-year-olds	19% ethnic minority (13% African American, 4% "Mixed race," 2% "Other")	Recruited from daycare centers, health department, and WIC programs; median annual family income $80,000-$95,000	Mothers	Supportive= 5.71 (0.62) Non-supportive= 2.25 (0.57)
Warren & Stifter (2008)	N= 78	49% female	Mean = 4.5 years	97% Caucasian (no other details included)	Recruited from community hospitals in Pennsylvania; "middle- to upper-middle-class"	Mothers	Supportive= 5.47 (0.72) Non-supportive= 2.43 (0.53)
Wong, McElwain, & Halberstadt (2009)*	N= 54	45% female	Mean= 5.7 years old; Range= 5-6.5-year-olds	73% European American, 7% African American, 4% Asian American, 2% Hispanic American, 14% Interracial	Mid-sized Southeastern city, recruited from public schools; median annual family income $85,000	Mothers	Supportive= 5.51 (0.85) Non-supportive= 2.55 (0.81)

Note. SES=socioeconomic status; CCNES= Coping with Children's Negative Emotions Scale; supportive scale scores were calculated as the mean of expressive encouragement, emotion-focused, and problem-focused scores; non-supportive scale scores were calculated as the mean of punitive, minimizing, and distress reaction scores. The range of CCNES scores is from 1-7, with 7 indicating more likely responses and 1 indicating less likely responses.

*In cases where the full supportive and non-supportive scores were not provided in the published article, the authors were contacted and subsequently provided the original means and standard deviations across all six subscales.

Table 2.

Maternal and Child Characteristics by Treatment Program, Recruitment Site, and Full Sample

	Treatment Programs		**Recruitment Site**		
Demographics	**Outpatient**	**Residential**	**NC**	**MD**	**Full Sample**
	n=45	*n*=29	*n*=35	*n*=39	*N*=74
Child gender (% female)	53.33%	62.07%	51.43%	61.54%	56.76%
Child age (years)	5.44 (1.70)	4.79 (1.70)	4.57 (1.65)	5.74 (1.60)	5.19 (1.72)
Maternal age (years)	32.89 (7.26)	29.48 (5.14)	29.57 (6.03)	33.33 (6.81)	31.55 (6.68)
Maternal ethnicity (%)					
Caucasian	55.6%	48.3%	65.7%	41.0%	52.7%
African American	31.1%	31.0%	17.1%	43.6%	31.1%
Hispanic/Latina	2.2%	3.5%	2.9%	2.6%	2.7%
Biracial/Multiracial	8.9%	6.9%	8.6%	7.7%	8.1%
Other	2.2%	10.4%	5.7%	5.1%	5.4%
Maternal education (%)					
8th grade or below	11.1%	6.9%	8.6%	10.3%	9.5%
Did not finish high school	22.2%	31.0%	14.3%	36.0%	25.7%
High school graduate/GED	40.0%	31.0%	42.9%	30.8%	36.5%
Did not finish college	13.3%	24.1%	20.0%	15.4%	17.6%
College graduate or Technical/vocational school	13.3%	6.9%	14.3%	7.7%	10.8%

Note. Outpatient treatment programs include methadone maintenance (n=41) and outpatient treatment without medication (n=4); residential treatment programs include those with methadone maintenance or suboxone treatment (n=8) and those without medication (n=21).

Table 3.

Mean Scores for Key Variables by Treatment Program, Recruitment Site, and Full Sample

	Treatment Programs			**Recruitment Site**			
Key variables Mean (SD)	**Outpatient**	**Residential**	*t*(df)	**NC**	**MD**	*t*(df)	**Full Sample**
	n=45	*n*=29		*n*=35	*n*=39		*N*=74
Maternal substance abuse							
Lifetime regular use (months)	9.30 (8.50)	11.97 (5.51)	*t*(72) = 1.64	8.17 (6.08)	12.29 (8.25)	***t*(72) = -2.43***	10.34 (7.55)
Current abstinence (months)	4.74 (8.77)	4.20 (4.35)	*t*(67) = -0.35	4.85 (7.40)	4.24 (7.31)	*t*(71) = 0.36	4.52 (7.31)
Abuse/dependence criteria met	8.64 (2.36)	9.72 (1.69)	***t*(72) = 2.14***	8.80 (2.53)	9.31 (1.79)	*t*(61) = -0.99	9.07 (2.17)
Postnatal drug exposure (% lifetime)	42.5% (25.4%)	60.4% (24.6%)	***t*(72) = 2.99****	50.5% (26.9%)	48.6% (26.3%)	*t*(72) = 0.31	49.5% (26.4%)
Prenatal drug use (months)	3.4 (4.08)	4.19 (3.76)	*t*(72) = 0.84	3.76 (4.12)	3.67 (3.85)	*t*(72) = 0.10	3.71 (3.95)
Maternal emotion socialization							
Supportive reactions -Typical	6.10 (0.82)	5.91 (0.99)	*t*(72) = -0.93	6.02 (0.87)	6.03 (0.92)	*t*(72) = -0.06	6.03 (0.89)
Supportive reactions – Drug use	5.78 (1.21)	4.99 (1.48)	***t*(72) = -2.52***	5.45 (1.51)	5.50 (1.24)	*t*(72) = -0.15	5.47 (1.37)
Supportive reactions - Sobriety	6.33 (0.76)	6.27 (0.86)	*t*(72) = -0.30	6.41 (0.70)	6.21 (0.88)	*t*(72) = 1.10	6.31 (0.80)
Non-supportive reactions -Typical	2.33 (0.88)	2.56 (0.82)	*t*(72) = 1.14	2.18 (0.93)	2.63 (0.75)	***t*(72) = -2.30***	2.42 (0.86)
Non-supportive reactions – Drug use	2.94 (1.25)	3.68 (1.35)	***t*(72) = 2.42***	3.06 (1.51)	3.38 (1.16)	*t*(72) = -1.01	3.23 (1.33)
Non-supportive reactions - Sobriety	2.21 (0.81)	2.32 (0.93)	*t*(72) = 0.53	1.91 (0.73)	2.56 (0.84)	***t*(72) = -3.55****	2.25 (0.85)
Consistency of reactions -Typical	5.56 (1.46)	5.75 (1.32)	*t*(72) = 0.58	5.85 (1.17)	5.43 (1.57)	*t*(72) = 1.30	5.63 (1.40)
Consistency of reactions – Drug use	5.22 (1.79)	4.77 (1.96)	*t*(72) = -1.01	5.03 (1.89)	5.05 (1.84)	*t*(72) = -0.06	5.04 (1.85)
Consistency of reactions - Sobriety	5.68 (1.67)	6.13 (1.32)	*t*(72) = 1.23	6.14 (1.32)	5.60 (1.70)	*t*(72) = 1.50	5.86 (1.54)
Maternal functioning							
Maternal psychopathology	0.87 (0.81)	0.92 (0.68)	*t*(72) = 0.24	0.85 (0.78)	0.92 (0.75)	*t*(72) = -0.39	0.89 (0.76)
Maternal emotional dysregulation	79.67 (26.04)	76.52 (24.74)	*t*(72) = -0.52	74.31 (25.94)	82.13 (24.67)	*t*(72) = -1.33	78.43 (25.41)
Negative parenting style	1.87 (0.39)	1.93 (0.50)	*t*(72) = 0.54	1.85 (0.44)	1.94 (0.43)	*t*(72) = -0.90	1.89 (0.44)
Child functioning							
Child psychopathology	9.47 (5.91)	10.48 (6.47)	*t*(72) = 0.70	9.17 (6.09)	10.49 (6.15)	*t*(72) = -0.92	9.86 (6.11)
Child emotion regulation	4.77 (0.79)	4.95 (1.03)	*t*(72) = 0.88	4.91 (1.01)	4.77 (0.78)	*t*(72) = 0.68	4.84 (0.89)
Birth weight	6lb 5oz (1lb 5oz)	6lb 4oz (1lb 9oz)	*t*(72) = -0.37	6lb 8oz (1lb 2oz)	6lb 2oz (1lb 9oz)	*t*(65) = 1.48	6lb 5oz (1lb 7oz)
Contextual risk factors							
Environmental stressors while using	1.76 (1.53)	2.52 (1.62)	***t*(69) = 2.00***	1.97 (1.58)	2.15 (1.63)	*t*(69) = -0.48	2.07 (1.60)

Note. Outpatient treatment programs include methadone maintenance (n=41) and outpatient treatment without medication (n=4); residential treatment programs include those with methadone maintenance or suboxone treatment (n=8) and those without medication (n=21). Significance levels are indicated by + for $p < .10$, * for $p < .05$, and ** for $p < .01$.

Table 4.

Zero-order Correlations between Key Variables

	Lifetime use	Abstinence	Abuse / dependence	Postnatal exposure	Prenatal exposure	Birth weight	Envnt. stressors	Supportive reactions (typical)	Non-supportive reactions (typical)	Consistency of reactions (typical)	Mother Psych.	Mother emotion dysreg.	Negative parenting	Child psych.	Child emotion reg.
Lifetime use	1.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Abstinence	-0.18	1.00	--	--	--	--	--	--	--	--	--	--	--	--	--
Abuse/ dependence	**0.35****	0.08	1.00	--	--	--	--	--	--	--	--	--	--	--	--
Postnatal exposure	0.09	**-0.24***	0.11	1.00	--	--	--	--	--	--	--	--	--	--	--
Prenatal exposure	**0.34****	-0.005	**0.22+**	**0.22+**	1.00	--	--	--	--	--	--	--	--	--	--
Birth weight	0.04	0.05	0.01	0.08	-0.06	1.00	--	--	--	--	--	--	--	--	--
Envnt. Stressors	0.10	0.12	**0.38****	0.07	0.16	0.10	1.00	--	--	--	--	--	--	--	--
Supportive reactions (typical)	-0.15	0.17	0.05	-0.04	0.11	-0.06	0.13	1.00	--	--	--	--	--	--	--
Non-supportive reactions (typical)	**0.20+**	-0.14	0.04	0.05	-0.07	-0.09	**-0.27***	**-0.24***	1.00	--	--	--	--	--	--
Consistency of reactions (typical)	-0.006	**-0.21+**	0.10	0.12	0.13	-0.15	0.08	**0.37****	-0.18	1.00	--	--	--	--	--
Mother psych.	-0.13	-0.02	**0.28***	0.02	0.009	-0.09	**0.32****	-0.007	0.05	-0.16	1.00	--	--	--	--
Mother emotion dysreg.	0.002	-0.03	**0.33****	-0.01	0.05	-0.01	0.19	0.02	0.17	-0.13	**0.79****	1.00	--	--	--
Negative parenting	0.19	-0.03	**0.25***	-0.03	0.08	-0.09	0.12	**-0.38****	**0.44****	**-0.38****	**0.32****	**0.47****	1.00	--	--
Child psych.	**0.24***	0.02	**0.27***	-0.02	0.01	-0.07	**0.26***	**-0.22+**	**0.32****	**-0.32****	**0.42****	**0.28***	**0.57****	1.00	--
Child emotion reg.	-0.12	-0.12	-0.15	0.17	0.05	-0.02	0.12	**0.25***	**-0.41****	**0.25***	-0.16	**-0.20+**	**-0.49****	**-0.51****	1.00

Note. Significance levels are indicated by + for $p < .10$, * for $p < .05$, and ** for $p < .01$.

Table 5.

Exploratory Factor Analyses testing Unidimensionality of the CCNES subscales: Step 1

STEP 1: Oblique Promax Rotated Factor Loadings from One Factor Exploratory Factor Analyses for the 7 CCNES subscales							
	Supportive Reactions			*Non-supportive Reactions*			*Supplemental*
CCNES item prompt: If my child…	Expressive Encouragement	Emotion Focused	Problem Focused	Distress Reactions	Punitive Reactions	Minimization Reactions	Consistency of Reactions
1. becomes angry because he is sick or hurt and can't go to his friend's birthday party	**0.325**	**0.584**	**0.454**	0.107	-0.175	**0.398**	**0.704**
2. falls off his bike and breaks it, and then gets upset and cries	**0.346**	**0.451**	**0.739**	**0.447**	**0.474**	**0.386**	**0.704**
3. loses some prized possession and reacts with tears	**0.533**	**0.339**		**0.340**	0.147	**0.598**	**0.739**
4. is afraid of injections and becomes quite shaky and teary while waiting for his turn to get a shot	**0.702**				**0.577**	**0.565**	**0.767**
5. is going over to spend the afternoon at a friend's house and becomes nervous and upset because I can't stay there with him	**0.844**	0.219	0.287	**0.633**	**0.580**	**0.653**	**0.884**
6. is participating in some group activity with his friends and proceeds to make a mistake and then looks embarrassed and on the verge of tears	**0.805**				**0.680**	**0.511**	**0.796**
7. is about to appear in a recital or sports activity and becomes visibly nervous about people watching him	**0.777**			0.263	**0.794**		**0.829**
8. receives an undesirable birthday gift from a friend and looks obviously disappointed, even annoyed, after opening it in the presence of the friend	**0.339**	**0.552**	0.217	0.204	-0.070	0.188	**0.868**
9. is panicky and can't go to sleep after watching a scary TV show	**0.658**	**0.896**		0.250	0.290	**0.775**	**0.805**
10. is at a park and appears on the verge of tears because the other children are mean to him and won't let him play with them	**0.493**			**0.371**	**0.605**	-0.184	**0.863**
11. is playing with other children and one of them calls him names, and my child then begins to tremble and become tearful	**0.561**		**0.547**	**0.354**	**0.685**	**0.375**	**0.862**
12. is shy and scared around strangers and consistently becomes teary and wants to stay in his bedroom whenever family friends come to visit	**0.508**			**0.574**	**0.408**	**0.443**	**0.805**

Note: blocked out items were dropped a priori due to extreme non-normality of item responses (i.e., >70% endorsement rate on one response option with remaining 30% poorly distributed); CCNES = Coping with Children's Negative Emotions Scale. Each item prompt (1-12) has seven corresponding items.

Table 6.

Exploratory Factor Analyses testing Unidimensionality of the CCNES subscales: Step 2

STEP 2:	**Oblique Promax Rotated Factor Loadings from Exploratory Factor Analyses for the 7 CCNES subscales: Final Models**							
	Supportive Reactions			*Non-supportive Reactions*				*Supplemental*
CCNES item prompt: If my child…	Expressive Encouragement 1 factor	Emotion Focused 1 factor	Problem Focused 1 factor	Distress Reactions 2 factor solution*		Punitive Reactions 1 factor	Minimization Reactions 1 factor	Consistency of Reactions 1 factor
				Externalized	Internalized			
1. becomes angry because he is sick or hurt and can't go to his friend's birthday party	**0.314**	**0.734**	**0.427**	**0.331**	-0.026	---	**0.403**	**0.716**
2. falls off his bike and breaks it, and then gets upset and cries	**0.341**	**0.541**	**0.833**	-0.108	**0.492**	**0.474**	**0.376**	**0.706**
3. loses some prized possession and reacts with tears	**0.526**	**0.430**		**0.412**	0.181	---	**0.598**	**0.734**
4. is afraid of injections and becomes quite shaky and teary while waiting for his turn to get a shot	**0.701**					**0.571**	**0.569**	**0.783**
5. is going over to spend the afternoon at a friend's house and becomes nervous and upset because I can't stay there with him	**0.841**	**0.337**	---	0.012	**0.636**	**0.557**	**0.666**	**0.882**
6. is participating in some group activity with his friends and proceeds to make a mistake and then looks embarrassed and on the verge of tears	**0.811**					**0.680**	**0.514**	**0.808**
7. is about to appear in a recital or sports activity and becomes visibly nervous about people watching him	**0.780**			**---**	**---**	**0.802**		**0.841**
8. receives an undesirable birthday gift from a friend and looks obviously disappointed, even annoyed, after opening it in the presence of the friend	---	---	---	---	---	---	---	---
9. is panicky and can't go to sleep after watching a scary TV show	**0.663**	**0.684**		**0.866**	-0.022	**---**	**0.761**	**0.791**
10. is at a park and appears on the verge of tears because the other children are mean to him and won't let him play with them	**0.493**			-0.087	**0.339**	**0.624**	---	**0.857**
11. is playing with other children and one of them calls him names, and my child then begins to tremble and become tearful	**0.559**		**0.484**	0.042	**0.301**	**0.683**	**0.380**	**0.858**
12. is shy and scared around strangers and consistently becomes teary and wants to stay in his bedroom whenever family friends come to visit	**0.512**			0.042	**0.625**	**0.398**	**0.446**	**0.791**

Note: blocked out items were dropped a priori due to extreme non-normality of item responses (i.e., >70% endorsement rate on one response option with remaining 30% poorly distributed); CCNES = Coping with Children's Negative Emotions Scale

--- indicates where item 8 was dropped due to poor item prompt and also due to low loadings on 4 of 7 scales; also indicates additional items dropped due to low factor loadings

Note. The correlation between the two distress reaction factors is r =0.27

Each item prompt (1-12) has seven corresponding items.

Table 7.

Means, Reliability Estimates, and Zero-order Correlations between the final CCNES Subscales Resulting from Factor Analyses

Typical CCNES Reactions										
	Supportive Reactions			*Non-supportive Reactions*				*Supplemental*	*Total Scales*	
	Expressive Encouragement Reactions M= 5.98 (0.97) α = .86	Emotion Focused Reactions M= 6.05 (1.04) α = .69	Problem Focused Reactions M= 6.05 (1.08) α = .59	Externalized Distress Reactions M= 1.88 (1.12) α = .55	Internalized Distress Reactions M= 3.51 (1.35) α = .59	Punitive Reactions M= 2.00 (1.13) α = .80	Minimization Reactions M= 2.28 (1.01) α = .75	Consistency of Reactions M= 5.63 (1.40) α = .95	Overall Supportive Reactions M= 6.03 (0.89) α = .90	Overall Non-supportive Reactions M= 2.42 (0.86) α = .87
Expressive Encourage.	1.00	--	--	--	--	--	--	--	--	--
Emotion Focused	**0.62****	1.00	--	--	--	--	--	--	--	--
Problem Focused	**0.61****	**0.65****	1.00	--	--	--	--	--	--	--
Externalized Distress	**-0.27***	**-0.32****	**-0.22+**	1.00	--	--	--	--	--	--
Internalized Distress	-0.08	-0.04	-0.12	0.18	1.00	--	--	--	--	--
Punitive	-0.17	**-0.29***	-0.12	**0.63****	**0.24***	1.00	--	--	--	--
Minimization	-0.07	-0.08	-0.07	**0.71****	**0.20+**	**0.64****	1.00	--	--	--
Consistency of Reactions	**0.38****	**0.23+**	**0.36****	-0.17	-0.16	-0.07	-0.14	1.00	--	--
Supportive Reactions	**0.85****	**0.88****	**0.88****	**-0.31****	-0.09	**-0.22+**	-0.09	**0.37****	1.00	--
Non-supportive Reactions	**-0.20+**	**-0.24***	-0.18	**0.81****	**0.59****	**0.82****	**0.81****	-0.18	**-0.24***	1.00

Note. Although confirmatory factor analysis indicated that the consistency subscale fell along the supportive dimension, it was retained separately in an effort to explore the unique importance of consistency of reactions, and the consistency subscale loaded less strongly than the other three subscales on the supportive factor. The values presented here reflect this decision; thus, the mean score for the overall supportive scale does not include consistency.

Note. Significance levels are indicated by + for $p < .10$, * for $p < .05$, and ** for $p < .01$.

Table 8.

Means and Reliability Estimates for the CCNES Scales across Contexts

	Typical	**Period of Drug Use**	**Period of Sobriety**
Supportive Reactions			
Expressive Encouragement	M= 5.98 (0.97), α = .86	M= 5.51 (1.51), α = .93	M= 6.26 (0.95), α = .90
Emotion Focused Reactions	M= 6.05 (1.04), α = .69	M= 5.49 (1.37), α = .78	M= 6.33 (0.96), α = .78
Problem Focused Reactions	M= 6.05 (1.08), α = .59	M= 5.42 (1.67), α = .78	M= 6.32 (0.87), α = .44
Non-supportive Reactions			
Externalized Distress	M= 1.88 (1.12), α = .55	M= 2.99 (1.65), α = .66	M= 1.66 (0.97), α = .52
Internalized Distress	M= 3.51 (1.35), α = .59	M= 3.83 (1.44), α = .64	M= 3.10 (1.42), α = .64
Punitive Reactions	M= 2.00 (1.13), α = .80	M= 2.87 (1.64), α = .89	M= 1.92 (1.16), α = .84
Minimization Reactions	M= 2.28 (1.01), α = .75	M= 3.23 (1.52), α = .87	M= 2.32 (1.10), α = .80
Supplemental			
Consistency of Reactions	M= 5.63 (1.40), α = .95	M= 5.04 (1.85), α = .98	M= 5.86 (1.54), α = .98
Total Scales			
Overall Supportive Reactions	M= 6.03 (0.89), α = .90	M= 5.47 (1.37), α = .95	M= 6.31 (0.80), α = .92
Overall Non-supportive Reactions	M= 2.42 (0.86), α = .87	M= 3.23 (1.33), α = .94	M= 2.25 (0.85), α = .89

Note. Although confirmatory factor analysis indicated that the consistency subscale fell along the supportive dimension, it was retained separately in an effort to explore the unique importance of consistency of reactions, and the consistency subscale loaded less strongly than the other three subscales on the supportive factor. The values presented here reflect this decision; thus, the mean score for the overall supportive scale does not include consistency.

Table 9.

Results of Regression with Maternal Substance Use Predicting Typical Emotion Socialization (Hypothesis 4)

	Maternal Emotion Socialization Variables					
	Supportive Reactions (typical) Model 1		Non-Supportive Reactions (typical) Model 2		Consistency of Reactions (typical) Model 3	
PREDICTORS	β	*t*	β	*t*	β	*t*
Control Variables (Step 1)						
Child age	-0.001	-0.20	-0.006	-1.31	0.0004	0.04
Child gender (0=female, 1=male)	0.07	0.31	-0.02	- 0.12	0.007	0.02
Child ethnicity						
Caucasian	0.12	0.44	-0.04	-0.16	0.52	1.21
African American	-0.41	-1.45	**0.69****	**2.87**	-0.38	-0.85
Maternal age	-0.03	-1.60	-0.01	-1.05	-0.01	-0.46
Maternal education	0.007	0.11	**-0.10***	**-2.04**	-0.03	-0.27
Recruitment site (0=NC, 1=MD)	0.25	1.05	0.32	1.59	-0.15	-0.40
Covariates (Step 2)						
Birth weight	-0.06	-1.03	0.02	0.44	-0.16	-1.59
Prenatal drug exposure	0.02	0.90	-0.03	-1.46	0.05	1.08
Current treatment program (0=residential, 1=outpatient)	0.14	0.57	-0.21	-1.07	-0.21	-0.55
Drug of choice						
Opiates	0.23	0.74	-0.26	-0.99	-0.008	-0.02
Polydrug users	0.04	0.15	-0.02	-0.08	-0.16	-0.37
Negative parenting style	**-0.81****	**-3.48**	**0.64****	**3.15**	**-1.37****	**-3.88**
Child psychopathology	-0.009	-0.42	0.006	0.34	-0.05	-1.35
Maternal psychopathology and emotional dysregulation	0.14	1.15	0.02	0.18	-0.009	-0.05
Environmental stressors	0.08	1.01	-0.09	-1.33	0.13	1.08
Main Effects of Maternal Substance Abuse (Step 3)						
Lifetime history of regular use	-0.01	-0.93	0.0005	0.04	-0.009	-0.41
Duration of current abstinence	0.01	0.94	-0.0005	-0.04	**-0.05***	**-2.18**
Abuse/dependence criteria met	0.08	1.49	-0.003	-0.06	**0.17***	**2.23**
Postnatal drug exposure	-0.11	-0.29	0.18	0.52	0.22	0.37
Full Model Effects						
F	**3.22***		**5.51****		**4.40****	
R^2	**0.13**		**0.33**		**0.19**	

Note. Reported values are unstandardized betas. Significance levels are indicated by + for $p < .10$, * for $p < .05$, and ** for $p < .01$. Child ethnicity was dummy coded as 0=Caucasian, 1=African American, reference group = other; current treatment program was dummy coded as 0=residential, 1=outpatient; drug of choice was dummy coded as 1=opiates, 2=polydrug, reference group = other.

Table 10.

Sensitivity Analyses: Results of Regression with Maternal Substance Use Predicting Emotion Socialization during periods of Drug Use (Hypothesis 4)

	Maternal Emotion Socialization Variables					
	Supportive Reactions (drug context) Model 1		Non-Supportive Reactions (drug context) Model 2		Consistency of Reactions (drug context) Model 3	
PREDICTORS	β	*t*	β	*t*	β	*t*
Control Variables (Step 1)						
Child age	-0.004	-0.49	-0.006	-0.79	-0.003	-0.28
Child gender (0=female, 1=male)	0.46	1.43	-0.50	-1.58	0.66	1.45
Child ethnicity						
Caucasian	0.08	0.18	-0.003	-0.01	-0.001	-0.00
African American	-0.63	-1.46	0.38	0.89	0.09	0.15
Maternal age	0.01	0.38	-0.03	-1.33	-0.01	-0.35
Maternal education	-0.10	-1.03	0.14	1.50	-0.20	-1.50
Recruitment site (0=NC, 1=MD)	0.11	0.29	0.56	1.56	-0.06	-0.12
Covariates (Step 2)						
Birth weight	-0.08	-0.87	0.02	0.19	-0.20	-1.53
Prenatal drug exposure	0.05	1.24	-0.05	-1.21	0.03	0.50
Current treatment program (0=residential, 1=outpatient)	0.54	1.58	-0.48	-1.52	0.26	0.52
Drug of choice						
Opiates	0.68	1.53	-0.64	-1.65	0.28	0.44
Polydrug users	-0.07	-0.18	0.01	0.03	0.11	0.19
Negative parenting style	**-0.89***	**-2.43**	0.52	1.34	-0.83	-1.30
Child psychopathology	0.003	0.09	-0.02	-0.72	-0.01	-0.27
Maternal psychopathology and emotional dysregulation	0.08	0.42	0.13	0.73	-0.18	-0.71
Environmental stressors	-0.11	-0.99	0.14	1.37	-0.17	-1.04
Main Effects of Maternal Substance Abuse (Step 3)						
Lifetime history of regular use	-0.02	-1.08	-0.0002	-0.01	-0.008	-0.26
Duration of current abstinence	-0.03	-1.26	0.03	1.28	**-0.10****	**-3.41**
Abuse/dependence criteria met	-0.06	-0.78	**0.19***	**2.31**	-0.08	-0.74
Postnatal drug exposure	-0.28	-0.46	0.26	0.45	-0.29	-0.36
Full Model Effects						
F	**2.47***		**2.64***		**3.41***	
R^2	**0.09**		**0.17**		**0.12**	

Note. Reported values are unstandardized betas. Significance levels are indicated by + for $p < .10$, * for $p < .05$, and ** for $p < .01$. Child ethnicity was dummy coded as 0=Caucasian, 1=African American, reference group = other; current treatment program was dummy coded as 0=residential, 1=outpatient; drug of choice was dummy coded as 1=opiates, 2=polydrug, reference group = other.

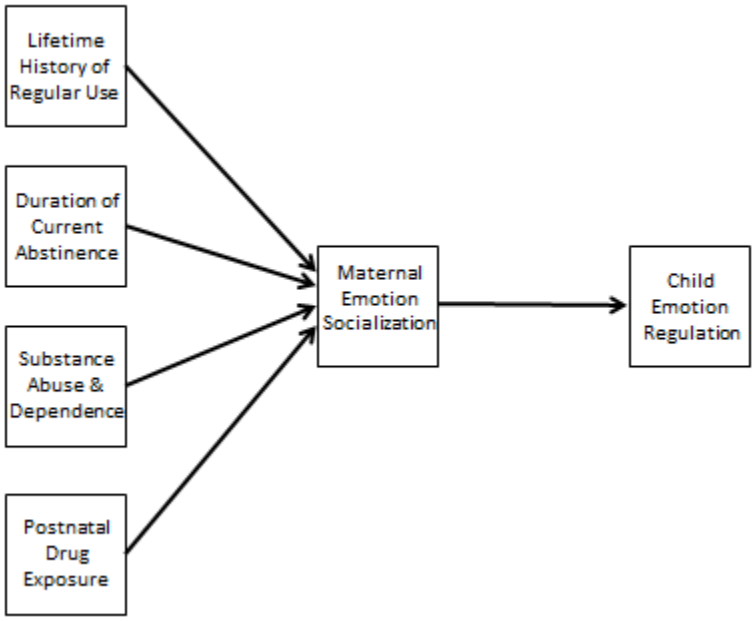

Figure 1. Substantive model indicating that maternal emotion socialization behaviors will mediate the relationship between maternal substance abuse factors and child emotion regulation.

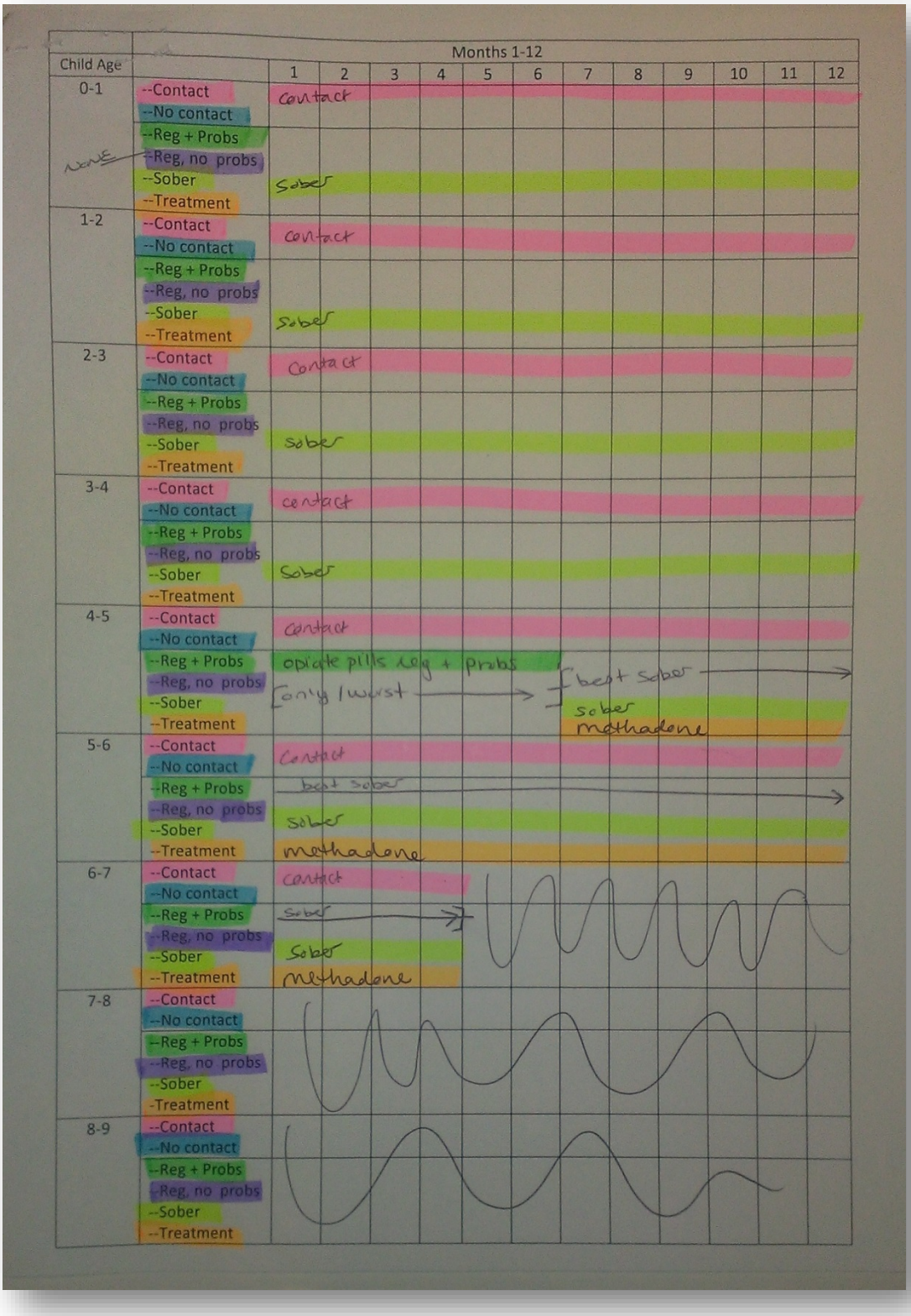

Figure 2. Example of a time-line follow-back administration from a mother with a 6-year-4 month old child

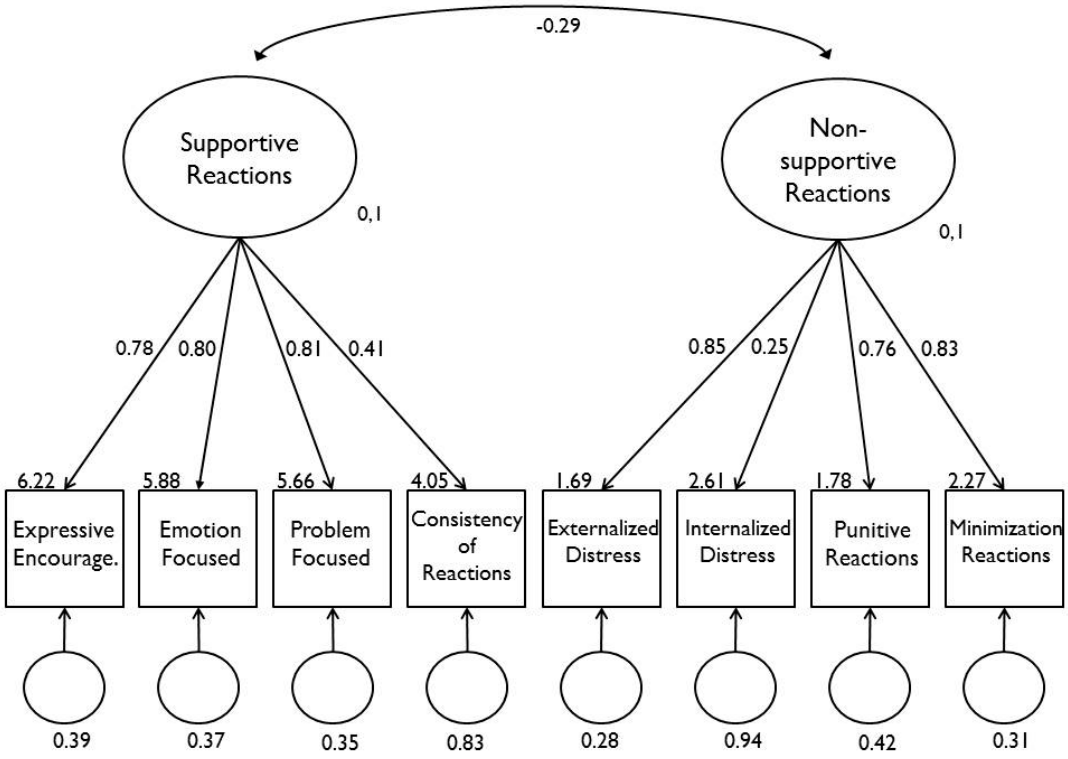

Figure 3. Two-factor confirmatory factor analysis of the Coping with Children's Negative Emotions Scale. Model fit: χ^2 (19)=21.83, *p*=.29; RMSEA=.045, 90% CI: 0.00 – 0.115; CFI=0.99; TLI=0.98. Standardized coefficients are presented. All coefficients are significant.

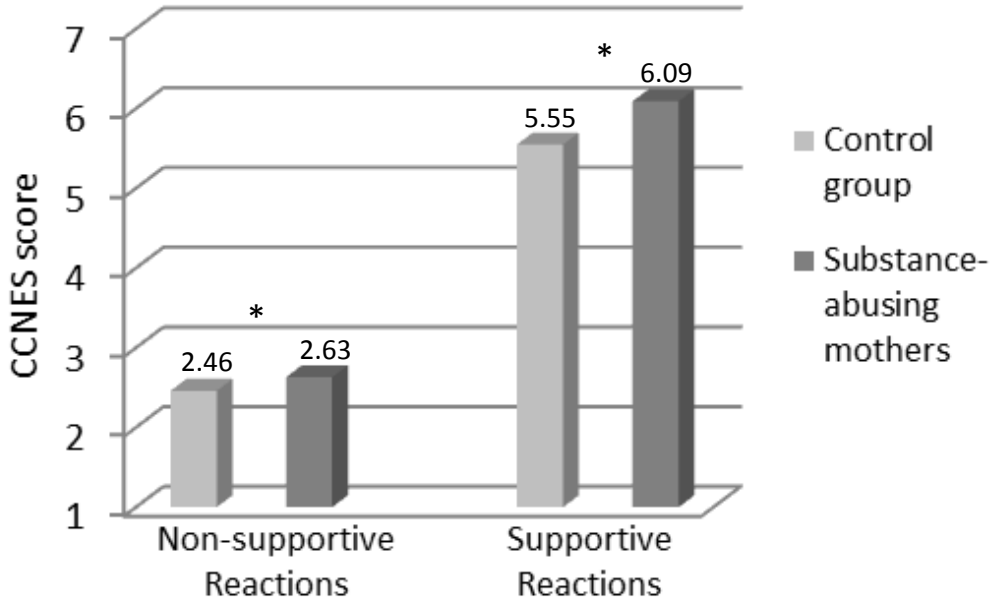

Figure 4. Results from hypothesis 1 showing that mothers in the current sample reported both significantly more supportive (z=6.98, $p < 0.0001$) and significantly more non-supportive (z=2.41, $p = .02$) reactions to their children's emotions compared to the general population of mothers. CCNES = Coping with Children's Negative Emotions Scale.

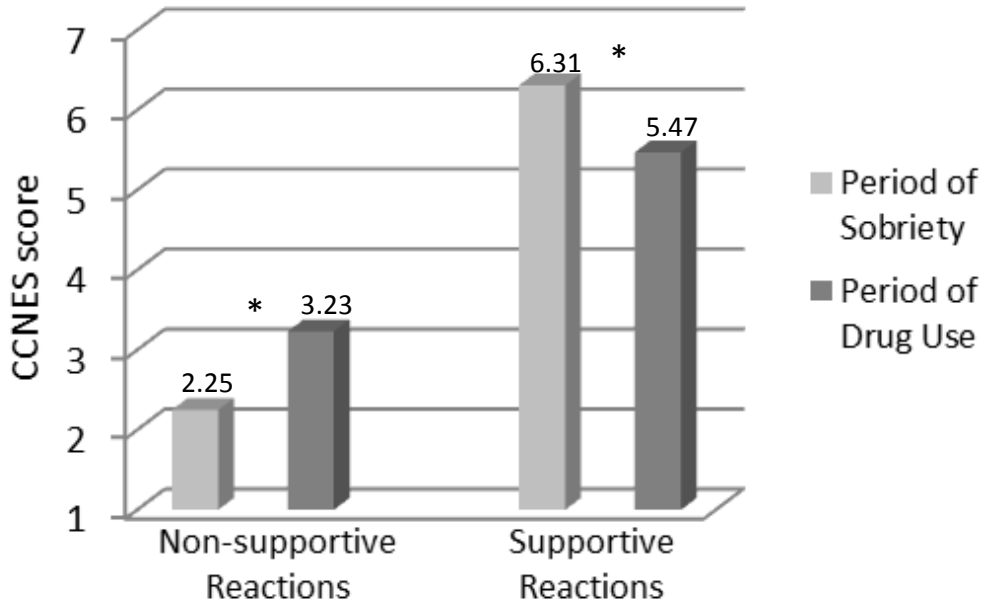

Figure 5. Results from hypothesis 2 showing that mothers were significantly more non-supportive while using than while sober ($t(73)=6.56$, $p<.0001$), and were significantly more supportive while sober than while using ($t(73)=5.69$, $p<.0001$). CCNES = Coping with Children's Negative Emotions Scale.

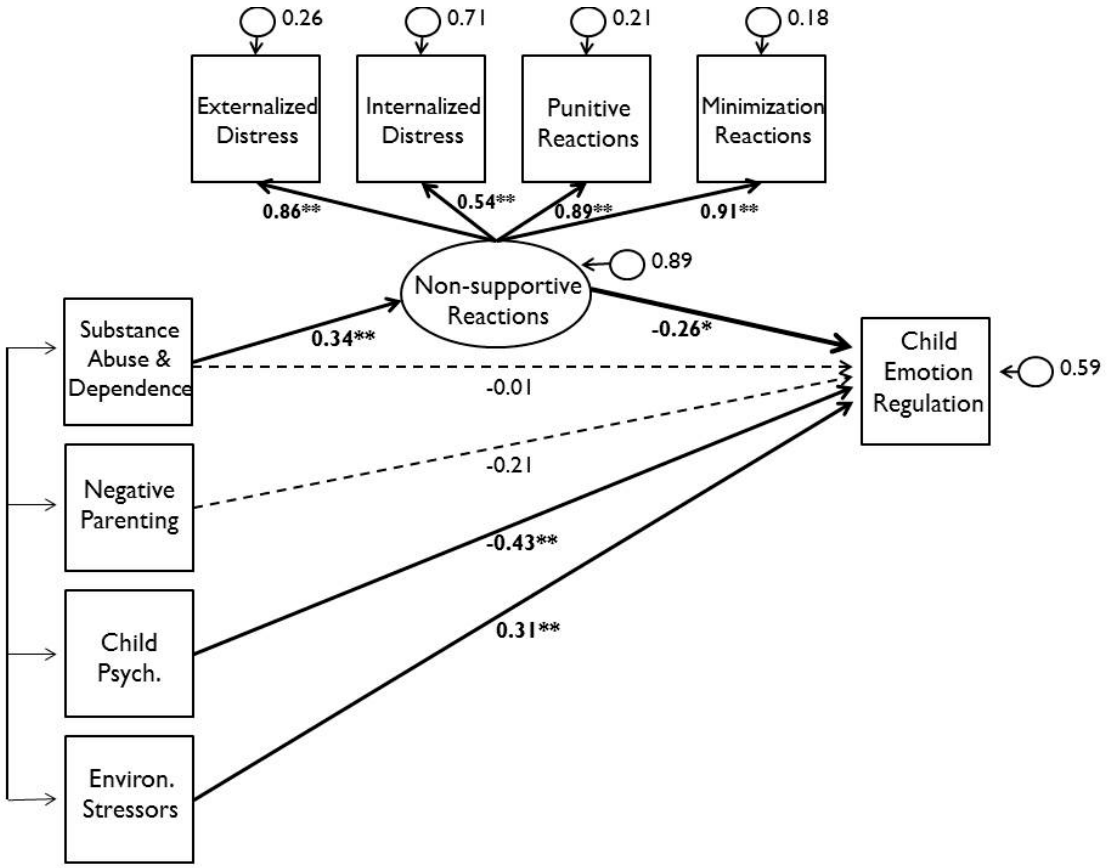

Figure 6. Final structural equation model testing the indirect of effect of maternal substance abuse/dependence on child emotion regulation via non-supportive reactions. Model fit: (χ^2 (20)= 37.93, *p*=.009; RMSEA= 0.11, 90% CI: 0.054-0.163; CFI=0.92, TLI=0.87). Standardized coefficients are presented. Significant coefficients are indicated by bolded paths and * for $p < .05$ and ** for $p < .01$. The specific indirect effect of maternal abuse/dependence on child emotion regulation via non-supportive reactions was significant: β= -0.09, *p*=.049.

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