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EMOTIONALLY AVOIDANT LANGUAGE IN THE PARENTING INTERVIEWS OF SUBSTANCE-DEPENDENT MOTHERS: ASSOCIATIONS WITH REFLECTIVE FUNCTIONING, RECENT SUBSTANCE USE, AND PARENTING BEHAVIOR

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Abstract

Parenting and emotion regulation are two known, and potentially interrelated, areas of impairment among substance-abusing mothers. In this study, we examine substance -abusing mothers' (positive and negative) emotion language word use during their discussion of negative parenting experiences on the Parent Development Interview for its association with reflective functioning (RF), recent substance-use history, and sensitivity to child cues. Within a sample of 47 methadone-maintained mothers, we evaluate the hypothesis that linguistic evidence of emotional avoidance (more frequent positive feeling words and less frequent negative emotion words) will be associated with lower RF, more recent substance use, and more insensitive parenting. Further, we evaluate whether language use mediates the association between self-focused RF and insensitive parenting. Results of hierarchical regressions suggest that more frequent positive feeling word use, but not negative emotion word use, is associated with lower RF, more recent substance use, and lower sensitivity to child cues. Positive feeling word use partially mediates the association between self-focused RF and insensitive parenting. Results are discussed in the context of their contribution to the literature on emotion and parenting in substance-abusing populations.

Parents with substance-abuse disorders are at particular risk for engaging in parenting practices that are impaired or inadequate and that often lead to deleterious developmental consequences for their children (Bauman & Dougherty, 1983; Beckwith, Howard, Espinosa, & Tyler, 1999; Burns, 1986; Mayes, 1995; Mayes, Bornstein, Chawarska, & Granger 1996; Mayes & Truman, 2002; Wellisch & Steinberg, 1980). They are more likely to exhibit verbal and physical aggression toward their children and score higher on measures of potential for child abuse than are parents without substance-abuse histories (Ammerman, Kolko, Kirisci, Blackson, & Dawes, 1999; Chaffin, Kelleher, & Hollenberg, 1996; Kelleher, Chaffin, Hollenberg, & Fischer, 1994). Although evidence has suggested heterogeneity of parenting practices in substance-dependent parents (Suchman & Luthar, 2001), as a group,

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parents who abuse substances are at higher risk than are non-substance-abusing parents for poor parenting, and their children are at greater risk for negative outcomes (Knight, Bartholomew, & Simpson, 2007; Mayes & Truman, 2002).

Parents with substance-abuse disorders also struggle with emotion regulation. Substance abuse itself may evolve as a self-medicating strategy used to protect against distress when other, more adaptive emotion regulatory skills are lacking (Khantzian, 1985, 1999). Ironically, however, in the long-term, substance use does not serve to regulate the user's emotions but instead is associated with worsening dysregulation (Koob & LeMoal, 1997). Because they struggle with regulating their own emotions, substance-abusing parents also may have difficulty accurately perceiving and sensitively responding to their children's emotional needs (Suchman, DeCoste, Leigh, & Borelli, 2010), the expression of which may be dyresgulating or puzzling to them (Kelley, 1992, 1998; Mayes & Truman, 2002). Further, the effects of the substances themselves may render parents less able to attend to their children's emotional needs (Leckman & Mayes, 1998), and even when substance-abusing parents are not under the influence of a substance, their pervasive preoccupation with procuring drugs may result in an abdication of parental responsibility (Maher, 2000; Murphy & Rosenbaum, 1999; Rosenbaum, 1981; Sterk, 1999; Taylor, 1993).

EVALUATING EMOTION IN PARENTING NARRATIVES: THE CONSTRUCT OF REFLECTIVE FUNCTIONING

In recent years, researchers have developed methods to examine emotional constructs thought to be central to parenting (Slade, 2005). Reflective functioning (RF) is an attachment-related construct that lately has received heightened attention (Fonagy, Gergely, Jurist, & Target, 2002; Fonagy, Steele, Steele, Moran, & Higgitt, 1991; Fonagy & Target, 1997; Fonagy et al., 1995; Slade, 2005). The presence of RF in narrative is evidence of the ability to mentalize (Slade, 2005), or the capacity to understand the complex interplay between emotions and behavior in the self and others (Fonagy et al., 1991; Slade, 2005). RF can be automatic or purposeful, but either way is the process through which the individual attempts to understand the myriad ways in which mental states (e.g., thoughts, feelings) can affect behavior (Slade, 2005).

Researchers contend that RF is a generalized skill that can be applied to a myriad of relationships. In the context of parenting, RF is the ability to understand the complex ways in which internal states such as emotions influence behavior in one's child and oneself (Slade, 2005). Parental RF enables a parent to identify the child's needs and respond sensitively to them. In so doing, parental RF communicates to the child that his or her needs can be met through the parent–child relationship and that his or her distress can be resolved effectively. Parental RF is commonly assessed using the Parent Development Interview (PDI; Aber, Slade, Berger, Bresgi, & Kaplan, 1985; Slade, Aber, Berger, Bresgi, & Kaplan, 2003), a semistructured interview in which the mother is asked to discuss a range of emotional experiences pertaining to herself as well as her child. Parental RF may be especially critical during early childhood (e.g., infancy and toddler years) when behavioral cues are the child's primary means for communicating to the parent about mental states (Suchman, DeCoste, Leigh, & Borelli, 2010).

We previously determined that parental RF on the PDI can be separated into two subtypes: self-focused RF and child-focused RF (Suchman, Decoste, Leigh, & Borelli, 2010). The self-focused section of the interview includes questions regarding the mother's negative emotional reactions to parenting her child (e.g., "Have you ever felt angry as a parent?") whereas the child-focused section contains questions regarding the child's emotional experience (e.g., "Does [child's name] ever feel upset?"). Self-focused RF is the capacity to

make sense of and modulate one's own emotional states related to parenting without becoming dysregulated (Suchman, DeCoste, Leigh, & Borelli, 2010). Because the self-focused section of the PDI focuses on intimate and negative parenting experiences, a mother high in self-focused RF must be especially adept at acknowledging, reflecting on, and understanding negative affects in the self, for example, by identifying the thoughts and feelings that motivate her behavior (e.g., "I think I got angry at her so easily because I was still feeling hurt by what my husband had said to me"), acknowledging the impact that parenting and her child have on her (e.g., "Sometimes I feel so depleted, like I'm spending every second thinking and doing for her, and I just desperately want someone to take care me"), and understanding that her child's mental state influences and is influenced by her own mental state (e.g., "She was angry that I didn't give her what she wanted, and so she hit me, which made me really mad at her"). A parent who instead focuses on positive emotions and/or avoids negative emotions on the self-focused portion of the PDI could be construed as avoiding negative affect related to parenting. Given that self-regulation is thought to be central to parenting, it is unsurprising that mothers' self-focused RF has the strongest predictive validity in terms of parenting behavior (Suchman, DeCoste, Leigh, & Borelli, 2010).

Given the complex interrelations between RF, parenting behavior, and parent and child emotion regulation (e.g., Slade, 2005), parental RF may be an important piece of the puzzle in understanding the parenting problems of adults with substance-abuse histories (Suchman, DeCoste, Leigh, & Borelli, 2010). Studies have shown that mothers with a substance-abuse history exhibit low RF on the PDI as compared to that of low-risk populations (Slade, Bernbach, Grienenberger, Levy, & Locker, 2005; Suchman, De-Coste, Leigh, & Borelli, 2010). Levy and Truman (2002) found that among cocaine-using mothers, maternal RF mediated associations between maternal substance abuse and children's psychosocial development (e.g., attention, social skills, and withdrawal). Further, improvement in overall RF in response to a mentalization-based parenting intervention is associated with improvement in substance-abusing mothers' parenting behavior (e.g., socioemotional growth-fostering and cognitive growth-fostering, sensitivity to cues, response to distress) and increased regulation in children between 24 and 36 months of age (Suchman, DeCoste, Castiglioni, Legow, & Mayes, 2008; Suchman, DeCoste, Castiglioni et al., 2010; Suchman, DeCoste, & Mayes, 2009).

EVALUATING EMOTION IN LANGUAGE: WORD-COUNT METHODOLOGIES FOR ANALYZING NARRATIVE

The system developed to evaluate RF uses a top-down, holistic coding approach (Fonagy, Target, Steele, & Steele, 1998; Main, Goldwyn, & Hesse, 2002) based on the assumption that the narrative gestalt (i.e., the meaning embedded in the whole narrative response) is more than the sum of its parts (i.e., the words that comprise the responses). In contrast, Cohn, Mehl, and Pennebaker (2004) and Pennebaker, Mehl, and Niederhoffer (2003) argued that the simple frequency of words that people use in natural language can reveal meaningful information about the internal structure of their emotional experience. For example, consider the psychological difference between saying "I'm not angry about it" and "I feel fine about it." Word-count researchers would argue that this subtle difference exposes meaningful information about the nature of an individual's emotional experience.

This bottom-up approach to analyzing the content of adults' language use has rapidly emerged as an important method for assessing emotion regulatory strategies (Pennebaker et al., 2003; Tausczik & Pennebaker, 2010). The words people naturally use to describe their life experiences have been found to be robustly associated with a wide variety of psychosocial outcomes, including, among others, relationship satisfaction and dissolution

(Seider, Hirschberger, Nelson, & Levenson, 2009; Simmons, Chambless, & Gordon, 2008; Simmons, Gordon, & Chambless, 2005; Slatcher & Pennebaker, 2006) and attachment classification (Borelli, David et al., 2012; Borelli, Sbarra, Mehl, & David, 2011).

In the current study, we specifically turn our attention to emotion language, which also has been studied for its relation to psychological adjustment. Researchers have shown interesting associations between emotion word use and other variables. Positive emotion word use increases with age (Pennebaker & Stone, 2003) and is higher in women's versus men's naturalistic speech (Mehl & Pennebaker, 2003). Conversely, negative emotion word use decreases with age (Pennebaker & Stone, 2003) and is negatively associated with self-esteem (Bosson, Swann, & Pennebaker, 2000). Despite this, no studies have examinedword use in the narratives of adults with substance-abuse histories, and only one study (Christian, Hoffman, Bucci, Crimins,&Worth, 2010) has examined word use in interviews about parenting.

CURRENT INVESTIGATION

In this study, we examine the emotional content of substance-abusing mothers' parenting narratives. Specifically, we evaluate whether emotion word use is associated with three constructs related to parenting sensitivity and emotion regulation: mothers' self-focused RF, recent substance use, and sensitivity to their child's cues in an interaction task. Contingent upon the establishment of an association between RF and emotion language, and between emotion language and maternal sensitivity, we also evaluate whether emotion language use mediates the association between RF and maternal sensitivity. In so doing, this work offers several key contributions to the field (discussed later).

RF and Linguistic Behavior

This study is the first to examine the overlap between two tools for probing emotion in narrative: the word-count methodology and the RF coding methodology. The motivation for examining this overlap is both theoretical and practical. On a theoretical level, these two paradigms provide radically different methods of understanding individuals' emotional experiences: one relies on intensive qualitative analysis of the emotional content of narrative, and the other utilizes simple word counts. With this study, we ask whether word use offers a parallel or unique perspective on emotional experience in parenting. Is self-focused RF reducible to variability in emotion word use, or do the two offer distinct, valuable perspectives on the emotional quality of narrative?

The practical motivation for conducting this study is the sheer cost of qualitative RF coding. To become a certified PDI coder, a researcher must attend a training that is several days long and complete a testing phase that lasts a minimum of several months. Once the PDIs are conducted and transcribed, the coding itself takes approximately 2 to 3 hrs per interview. Thus, if it were possible to reliably predict RF from linguistic parameters—for example, by using emotion word frequency—researchers might be able rely on word-use information automatically derived from PDIs as a proxy for RF. Ultimately, this type of analysis could enable researchers to examine important relationship processes in a more cost-effective manner without always having to implement full-scale, manualized PDI codings.

Our hypotheses in this study specifically focus on emotional content words, and specifically on word use indicative of emotional avoidance. Given that the self-focused section of the interview requires that mothers ponder their own negative emotional parenting experiences, frequent positive word use and infrequent negative emotion word use would suggest that the mother is unable to openly reflect on her negative emotional experiences related to parenting, and therefore is engaging with the interview in an emotionally avoidant manner

(considered a hallmark of low RF; Fonagy et al., 1998; Slade et al., 2003). Therefore, we predict that more frequent use of positive emotion words and less frequent use of negative emotion words will be associated with low RF scores (for a table summarizing study hypotheses, see Table 1).

Linguistic Behavior in the Substance-Using Population

This study is the first exploration of the word-count methodology in the narratives of a substance-dependent population. Therefore, one of the central goals of this project is to evaluate whether specific categories of word use are associated with recent substance use. As an ill-fated means of restoring emotional regulation during episodes of affect dysregulation (Khantzian, 1985, 1999), substance abuse also can be viewed as a form of emotional avoidance. We therefore hypothesize that mothers who report recently using more substances will use more positive emotion words (indicating greater emotional avoidance) and fewer negative emotion words (indicating low emotional tolerance; see Table 1).

Implications of Word Use for Parenting Behavior

Another goal of this investigation is to examine whether word use is associated with parenting behavior, and specifically, whether emotionally avoidant word use is associated with reduced sensitivity to child cues. Mothers who are unable to openly discuss their negative emotional experiences of parenting also may exhibit insensitivity to their child's cues. Therefore, we hypothesize that greater positive emotion and lower negative emotion word use on the self-focused section of the PDI will be associated with less optimal parenting behavior (i.e., lower sensitivity to child cues) during a structured mother–child interaction task (see Table 1).

Emotion Word Use as a Mediator of the Association Between Self-Focused RF and Parenting Behavior

Contingent upon finding that self-focused RF and emotion word use are associated constructs, and that emotion word use is associated with sensitivity to child cues, we can then evaluate whether emotion language use helps explain the observed association between self-focused RF and parenting (Suchman, DeCoste, Leigh, & Borelli, 2010). We hypothesize that emotion word use will mediate the association between self-focused RF and insensitivity to child's cues.

METHOD

Sample

Data used in this study were collected as part of a randomized controlled clinical trial testing the efficacy of a mentalization-based parenting intervention for mothers with substance-use disorders (see Suchman, DeCoste, Castiglioni et al., 2010; Suchman, DeCoste, McMahon, Rounsaville, & Mayes, 2011). All data presented here were collected prior to treatment (i.e., during baseline assessments). Mothers were referred to the study by their primary substance-use-treatment clinicians at one of four substance-use programs (three methadone clinics and one outpatient clinic) run by a nonprofit organization in a small and ethnically diverse Northeastern city. Mothers were eligible for the study if they were enrolled in one of the treatment programs and were caring for a child between birth and 36 months of age. Mothers were excluded from participating if they were in an acute state of crisis or severely cognitively impaired. In this 3-year study, a total of 56 mothers met inclusion criteria and completed informed consent procedures. Forty-seven mothers completed the baseline assessments in their entirety and were randomized to treatment. Demographic data for the sample are reported in Table 2.

Procedure

After completing informed consent procedures, mothers were scheduled for four subsequent visits to complete baseline assessments. Mothers were asked to choose one child between birth and 36 months of age to be the focus of the assessments during the study. During baseline visits, mothers completed a psychosocial evaluation, the Beck Depression Inventory (BDI; Beck, Steer, & Brown, 1996), the PDI, and a brief teaching interaction session with the focal infant/toddler. Mothers were compensated between $5 and $15 dollars for each assessment visit, and children received an age-appropriate toy after completing the teaching session.

Baseline Assessments

Psychosocial evaluation—The psychosocial evaluation was used to characterize the sample. Interviews lasted $1\frac{1}{2}$ hr and were conducted by a clinically trained research assistant. During the interview, mothers were asked about family demographic information, child developmental history, personal substance use and psychiatric history (including during pregnancy), family substance use and psychiatric history, medical history, legal involvement, employment history, and reasons for seeking help with parenting.

This interview was used to determine demographic and psychosocial characteristics and substance-use severity in the sample. Substance-use severity was based on mothers' reports of whether and how much of 15 different classes of drugs (e.g., cocaine, heroin, methamphetamines) they had consumed in the past 30 days. Because we were interested in recent use of *any* substance, we computed the mean number of days in the last 30 that mothers reported using any substances. Forty (85%) of the mothers reported using substances at least 1 of the past 30 days, and 22 (47%) of mothers reported using substances 16 or more days of the past 30. The most commonly used drugs in this sample were heroin and cocaine (powder and crack).

Depressive symptoms—The BDI (Beck et al., 1996) was used to assess maternal symptoms of depression. The BDI is a widely used, 21-item questionnaire probing depression related symptoms, each on a 4-point scale from 0 (absence of symptom) to 3 (full endorsement of the symptom). The BDI yields a total score for depression ranging from 0 to 63: Scores between 13 and 19 indicate mild depression, with scores above 29 indicating clinical depression (Beck et al., 1996). The BDI has very good psychometric properties that have been well-documented, including high internal consistency and construct validity (Beck et al., 1996).

RF—The Parent Development Interview-Revised (PDI-R; Slade et al., 2003) was used to measure the mother's capacity for RF. The PDI is a $1\frac{1}{2}$ hr, semistructured interview that contains 17 questions designed to elicit the mother's narrative about her relationship with her child. Some questions ask the mother to describe times when she was personally challenged as a parent (e.g., times when the mother felt angry, guilty, or needy). Additional questions ask the mother to describe situations that were difficult for her child (e.g., times when the child was upset or needed attention or when mother and child were separated). Other questions ask the mother to describe different kinds of interactions with her child (e.g., times when she and her child were getting along, times when they were not getting along). The interview was generally designed to evoke mentalization.

PDIs were administered by a master's-level research assistant and were digitally recorded and transcribed. Responses to each question were then rated on an 11-point scale

representing the level of RF exhibited by the mother in her response from-1 (rejection or unintegrated, bizzare, or inappropriate RF) to 9 (exceptional RF) (these coding methods were originally developed by Fonagy et al., 1998, for use with the Adult Attachment Interview (AAI) by George, Kaplan, & Main, 1984, 1985, 1996, and then adapted for use with the PDI by Slade et al., 2005). A rating of 1 indicates a complete absence of any recognition of mental states (i.e., events are described solely in terms of behavior and individuals solely in terms of global personality traits). A rating of 3 (most common in clinical populations; Allen, Fonagy, & Bateman, 2008) indicates a limited capacity to acknowledge mental states without any understanding of how mental states function and without demonstrating understanding regarding their relation to each other or to behaviors. A rating of 5 (most common in nonclinical populations; Allen et al., 2008) indicates the presence of a rudimentary capacity for RF—or a basic understanding of how mental states work together and influence behavior. A rating above 5 indicates an increasingly elaborate and sophisticated understanding of how mental states function and influence behavior. Transcriptions were coded by the first author (J.B.) who was trained to reliability by the fourth author (N.S.) and remained blind to treatment assignment and all other information about mother–child dyads during the study. To establish interrater reliability, the coder and N.S. independently rated 13 transcripts and achieved good reliability ($r \geq .90$) on 12 items.

For the purposes of this investigation, we focused solely on a mother's responses to the four questions that explicitly examine her emotional responses to parenting ("How has being a parent changed you?" "Have you ever felt needy as a parent?" "Have you ever felt angry as a parent?" "What gives you the most pain or difficulty as a parent?"). These questions were clustered together on the basis of a factor analysis yielding two dimensions of RF on the PDI: self-focused RF and child-focused RF, with self-focused RF being the most predictive of caregiving behavior (for a more detailed description of the factor analysis, see Suchman, DeCoste, Leigh, & Borelli, 2010). We computed a mean score of each participant's RF score on the four items. Importantly, we also report participants' overall RF score (the RF score assigned to the participant on the basis of the demonstrated RF throughout the entire interview).

Word-count-based linguistic analysis of the PDIs—After removing the interviewers' statements from verbatim transcripts, the PDI texts were edited according to the format required by the Linguistic Inquiry and Word Count system (LIWC; Pennebaker, Francis, & Booth, 2001). Edited texts were then double- and triple-checked by two research assistants well-versed in the LIWC editing protocol. These transcripts were then submitted to LIWC analysis. LIWC operates by comparing each word of a text to an internal dictionary consisting of 74 standardized linguistic (e.g., personal pronouns) and psychological (e.g., positive and negative emotion words) dimensions. The output tabulates word use as a percentage of total words in a text that fall into a given category (e.g., percentage of words that were negative emotion words), thereby accounting for length of interview. From the 74 LIWC categories, only those that comprise the negative emotion (e.g., "hate," "worthless," "enemy") and positive feeling[1] ("happy," "joy," "love") indices were selected for the purpose of this study (for an example of a similar word-selection procedure, see Rodriguez, Holleran, & Mehl, 2010).

Parenting behavior—The Nursing Child Assessment Satellite Training Teaching Scales (NCAST; Barnard & Eyres, 1979) were used to measure parenting behavior with the child.

[1]We elected to use the LIWC positive feeling category rather than the superordinate positive emotion word category (e.g., "happy," "pretty," "good") because the positive feeling category focuses more on emotion words as opposed to the positive emotion category, which also includes descriptive words (e.g., "pretty"). However, the findings follow the same pattern when we use the positive emotion word category as an independent variable.

The NCAST is a widely used, standardized, 73 binary-item tool used to observe and rate quality of caregiver–child interactions with children ages birth to 36 months. Use of the NCAST with substance-abusing and psychiatrically at-risk populations was reported by Huebner (2002) and Jung, Short, Letourneau, and Andrews (2007).Mothers are asked to choose one developmentally appropriate task to teach the child from a list of tasks that are organized in increasing order of difficulty. Tasks for infants between 0 and 3 months include holding a rattle, following the rattle with the eyes, and showing the caregiver his or her tongue. For an infant between 3 and 6 months, tasks include transferring a block from one hand to other and squeaking a squeak toy. Tasks for infants between 6 and 9 months include scribbling on a piece of paper and picking up a food object and eating it. Tasks for children 9 to 16 months include stacking blocks on top of each other. For infants between 12 and 18 months, tasks include stacking blocks, pointing to body parts in a picture book, pulling a toy car by a string, playing pat-a-cake, and taking the lid off a small container. For children ages 18 to 24 months, tasks include stringing beads, imitating a line on paper with a crayon, buttoning a button, and assembling a three-piece puzzle. Tasks for children ages 24 to 32 months include balancing on one foot and pulling a zipper. Finally, tasks for children ages 32 to 36 months include sorting blocks by color, finding a piece of clothing in a picture book, drawing a shape with a crayon, drawing alphabet letters, and cutting a predrawn shape with scissors. The teaching session lasts 5 min.

The teaching sessions were digitally recorded using two remotely controlled cameras that captured close-up and wide-angle views of mother and child on a split screen. The sessions were coded by a certified NCAST rater, who was trained to reliability by the third author (C.D., an NCAST-certified instructor) and remained blind to treatment assignment and all other information about the mother–child dyads during the study.

The overall quality of parenting behavior is rated during the teaching task on four behavioral dimensions: sensitivity to cues, response to distress, socioemotional growth fostering, and cognitive growth fostering. The Sensitivity to Cues subscale is an 11-item scale that measures the mother's capacity to accurately read the cues given by her infant or child and to sensitively support her child in his or her attempts to complete the task. The scale consists of items tapping caregiver's sensitivity to the child's physical, cognitive, and emotional needs (e.g., "Caregiver physically positions child so that he/she is safely supported." "Caregiver positions child so that it is possible for them to have eye-to-eye contact with one another during the majority of the teaching episode (60%)." "Caregiver avoids physically forcing the child to complete the task." "Caregiver praises child's successes or partial successes."). NCAST raters are trained to evaluate parents on the sensitive behavior required to support a child at each developmental stage. National norms that were available for the Sensitivity to Cues subscale are reported, along with clinical cutoff scores, in Table 2. Clinical cutoff scores were calculated using normative data and guidelines provided by NCAST authors (Barnard & Eyres, 1979) and represent 1 *SD* below the mean in a normative sample of mothers who completed high school.

Data Analytic Plan

To evaluate study hypotheses, we conducted a series of hierarchical linear regressions. As a conservative test of study hypotheses, we also included variables that we anticipated would be related to independent or dependent variables as covariates: mother age, current mother depressive symptoms, child gender, and child age. With respect to our mediation analysis, we first planned to confirm that (a) the independent variable was associated with the dependent variable, (b) the independent variable was associated with the mediator, and (c) the mediator was associated with the dependent variable (Baron & Kenny, 1986). Our plan was then to conduct an additional regression with the covariates entered in the first step, the independent variable (RF) entered in the second step, and the mediator (emotion language)

entered in the third step to determine if the presence of the mediator in the model reduced the association between the independent and dependent variables (see Baron & Kenny, 1986). The magnitude of mediation was determined by identifying the proportion or percentage of variance originally attributed to the independent variable that was subsequently explained by the mediator.

RESULTS

Descriptive Data

Table 2 reports means and standard deviations for all study variables. Average scores for RF and psychiatric symptoms fell close to clinical cutoffs; average scores for parenting behavior (sensitivity to child's cues) fell within normal limits. Child gender was unrelated to study variables; therefore, it was not retained as a covariate in subsequent analyses. Bivariate correlations revealed that maternal age was positively associated with self-focused RF, $r = 0.35$, $p < .05$, and that child age was negatively associated with frequency of mother's positive feeling word use on the PDI, $r = -0.37$, $p < .01$. Maternal depressive symptoms also were negatively associated with positive word use frequency, $r = -0.34$, $p < .05$, and positively associated with self-focused RF, $r = 0.33$, $p < .05$. Table 3 presents a correlation matrix including all study variables.

H1: Emotion Word Use and Self-Focused RF

The regression examining positive feeling word use revealed that after controlling for child and mother age in the first step, $R^2 = .16$, $p < .05$, and maternal depressive symptoms in the second step, $\delta R^2 = .04$, p = n.s., positive feeling word use added to the prediction of self-focused RF, $\delta R^2 = .20$, $p < .01$. Participants who used more frequent positive feeling words had lower self-focused RF scores (see Table 4).

The regression examining negative emotion word use revealed that after controlling for child and mother age in the first step, $R^2 = .16$, $p < .05$, and maternal depressive symptoms in the second step, $\delta R^2 = .04$, p = n.s., negative emotion word use did not add to the prediction of self-focused RF, $\delta R^2 = .01$, p = n.s.

H2: Recent Substance Use and Emotion Word Use

The regression examining the association between recent substance use and positive feeling word use revealed that after controlling for child and mother age in the first step, $R^2 = .16$, $p < .05$, and maternal depressive symptoms in the second step, $\delta R^2 = .06$, p = n.s., recent substance use added to the prediction of positive feeling word use, $\delta R^2 = .17$, $p < .01$. Participants who reported using more substances within the past 30 days used more frequent positive feeling words.

The regression examining the association between recent substance use and negative emotion word use revealed that after controlling for child and mother age in the first step, $R^2 = .06$, p = n.s., and maternal depressive symptoms in the second step, $\delta R^2 = .02$, p = n.s., recent substance use did not add to the prediction of negative emotion word use, $\delta R^2 = .01$, $p < .01$.

H3: Emotion Word Use and Maternal Sensitivity

The regression examining positive feeling word use revealed that after controlling for child and mother age in the first step, $R^2 = .01$, p = n.s., and maternal depressive symptoms in the second step, $\delta R^2 = .01$, p = n.s., positive feeling word use predicted maternal sensitivity, $\delta R^2 = .09$, $p < .05$. Participants who used more frequent positive feeling words were rated as less sensitive in the NCAST (see Table 4).

The regression examining negative emotion word use revealed that after controlling for child and mother age in the first step, $R^2 = .01$, p = n.s., and maternal depressive symptoms in the second step, $\delta R^2 = .01$, p = n.s., negative emotion word use did not add to the prediction of maternal sensitivity, $\delta R^2 = .01$, p = n.s.

H4: Mediational Model

As stated earlier, following the recommendations of Baron and Kenny (1986), to evaluate emotion word use as a mediator, we first had to satisfy three preconditions. The association between self-focused RF and maternal sensitivity was previously reported for this sample (Suchman, DeCoste, Leigh, & Borelli, 2010). In this study, we established that self-focused RF is associated with positive feeling word use (see H1) and that positive feeling word use is associated with maternal sensitivity (see H3). Therefore, we elected to proceed with our evaluation of positive feeling word use as a mediator of the association between self-focused RF and maternal sensitivity. We did not evaluate negative emotion use as a mediator because the preconditions were not met for this variable.

We conducted a fourth hierarchical linear regression to evaluate whether the inclusion of positive feeling word use in the model resulted in a meaningful reduction in the strength of the association between the independent variable (self-focused RF) and the dependent variable (maternal sensitivity). We found that including positive feeling word use in the model resulted in a 70% reduction of the association between self-focused RF and maternal sensitivity, indicating a partial mediation by positive feeling words (see Table 5).

DISCUSSION

The word-count methodology as applied to narrative has yielded an impressive body of research (Pennebaker et al., 2003), contributing to our understanding of the behavioral correlates and manifestations of psychopathology, emotion, and social behavior. Our goal in conducting this study was to apply this methodology to the investigation of the links between emotional avoidance, substance use, and parenting behavior in methadone-maintained mothers. Our results, which we review in detail next, point to the importance of positive feeling word use as a measure of emotional avoidance on the self-focused section of the PDI.

Positive Feeling Word Use and Low RF

More frequent positive feeling word use on the self-focused section of the PDI was associated with lower self-focused RF. In other words, the more frequently mothers used positive feeling words on the self-focused section of the PDI, the lower their RF score. Understanding the context in which this language occurred is central to the interpretation of these findings. In the self-focused section of the interview, the mothers were responding to questions regarding extremely intimate and negative experiences as a mother. Greater use of positive feeling words was therefore incongruent and suggested avoidance of the negative emotions queried in the item. The use of positive feeling words would mean something very different in the context of a question asking about positive emotional experiences, in which case positive feeling words would not be conceptualized as emotional avoidance of the question. For instance, more frequent positive feeling word use on a question explicitly tapping shared positive emotional experience (“Can you tell me about a time when you a your child really clicked?”), was associated with higher, and not lower, RF, $r = 0.32$, $p < .05$.

In terms of the larger context for this sample, too, the ability to reflect on negative emotional experiences related to parenting seems especially important for the relational health of the parent–child dyad. Many of the mothers in the sample had experienced Department of

Children and Families involvement, including having their child(ren) temporarily removed from their care. In other words, their actions had resulted in significant hardship for their child(ren), and to rebuild the relationship, it seems essential that these mothers be able to acknowledge and reflect on their negative emotional experiences of parenting, such as their feelings of guilt. This issue of context also may explain why in this sample, depressive symptoms are positively associated with self-focused RF—given what these women have experienced in their capacity as mothers, those who demonstrate the ability to reflect on their own emotions related to parenting are more likely to experience dysphoria (for further discussion, see Luthar, Doyle, Suchman, & Mayes, 2001; Suchman, McMahon, DeCoste, Castiglioni, & Luthar, 2008).

The ability to address the emotions being queried, or to generate a coherent narrative, is an issue that has been widely discussed among researchers who have examined adult attachment (e.g., Hesse, 2008). Researchers have argued that narrative coherence is the hallmark of a secure attachment representation on the AAI (George et al., 1984, 1985, 1996; Main et al., 2002), and this also is an important characteristic of interviews of those with high RF (Fonagy et al., 1998; Slade et al., 2005). More frequent use of positive feeling words in a mother's response to questions probing negative emotional experiences may therefore serve as a proxy for violations of coherence, and perhaps it is this underlying factor that accounts for the strong association between positive feeling word use and self-focused RF.

The finding that links positive feeling word use and low RF has especially important implications for relationship research. As stated earlier, a difficulty of conducting research on RF and attachment representations is the very high cost involved in coding PDIs. RF on the PDI is an excellent predictor of a variety of psychosocial indices such as parenting behavior (Levy & Truman, 2002), child attachment security, (Fonagy et al., 1995; Fonagy et al., 1991; Steele&Steele, 2008), and child behavioral regulation (Suchman, DeCoste et al., 2008; Suchman et al., 2009). Thus, if researchers could predict RF from automatically derived linguistic analyses, this could enable researchers interested in RF to examine a proxy construct at a lower cost. While such a solution remains promissory at this point, it has been successfully developed for other individual difference measures (Mairesse, Walker, Mehl, & Moore, 2007). More research is needed for word-count analysis to supplement or replace the traditional RF coding scheme.

Positive word use and recent substance abuse—More recent substance-abuse history was associated with greater frequency of positive feeling word use. Khantzian (1985, 1999) suggested that substance abuse serves a self-medicating function: Individuals turn to substances to numb themselves from painful, negative emotion or to artificially enhance positive emotion. In other words, individuals use substances in part to avoid negative or painful emotion. Our findings indicate that the same avoidance that fuels substance use also manifests in emotionally avoidant language on the PDI. However, more research is needed to identify underlying mechanisms. It is possible that substance use *precipitates* avoidance of emotionally difficult topics and absence of emotional connection with one's child, but it also is possible that emotionally disengaging from the parent–child relationship causes mothers to revert back to substance use. Further, the association between positive emotion word use and recent substance use also may be explained by other psychological characteristics (e.g., impulsivity, neuroticism, anxiety) of mothers who become substance-dependent and are unable to stop using (Fisher, Elias, & Ritz, 1998; Martin & Sher, 1994; Piedmont & Ciarrocchi, 1999). Future studies examining word use in the parenting narratives of substance-dependent adults should control for other potentially related psychological traits such as neuroticism and impulsivity.

Along these lines, researchers have suggested that substance dependence interferes with a parent's ability to bond with a child because the neural circuitry involved in parental motivation is co-opted by substances (Leckman & Mayes, 1998). Substances also are known to lower adult stress tolerance (Sinha, 2001). Neurological changes resulting from substance dependence may impair a mother's ability to tolerate and/or express negative emotions, including those related to parenting. Future research is needed to compare substance-dependent mothers with high-risk, non-substance-dependent mothers on positive feeling word use (and other indices of alexithymia) to better understand the role of substance dependence in the experience and tolerance of emotions. Future studies also can examine parenting narratives of substance-dependent mothers over time to evaluate whether positive feeling word use changes within individuals as a function of longer periods of abstinence.

Positive feeling word use and parenting behavior—We also found that more frequent positive feeling word use was associated with parenting insensitivity to child cues. Assuming that greater positive feeling word use on the self-focused section of the PDI indicates avoidance of negative emotions, this finding is consistent with the idea that mothers who cannot openly discuss and experience their own negative emotions will be less able to be attuned to their child's emotional cues and needs. This provides further evidence that the way in which mothers discuss their own emotional experiences of parenting is associated with their behavior with their child. Parental sensitivity is a well-documented precursor to the infant's development of a secure attachment (De Wolff & van IJzendoorn, 1997), which in turn is a robust predictor of psychological adjustment across the life span (e.g., Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005). Therefore, variables that are associated with parental sensitivity may be important in the prediction of child outcomes. Future research should examine whether these findings pertain to nonclinical samples of parents in addition to substance-dependent ones and whether parents' positive emotion word use on the PDI predicts infant attachment security. Future research will be needed to evaluate whether language quality (which presumably reflects quality of cognitive and emotional self-organization related to parenting) serves as a risk factor for the development of insensitive parenting. For example, among samples in which the PDI or a similar parenting interview is administered while the mother is pregnant, does language on the interview predict later parenting behavior? Further, when examining response to interventions whose primary goal is to improve parenting behavior, do language changes on parenting interviews precede behavioral change? If research establishes that certain patterns of language use on parenting interviews are risk factors for maladaptive types of parenting behavior among substance-dependent parents (e.g., low sensitivity to child cues), then this may suggest that interventions aiming to change parents' mental representations of their relationship with their child, as opposed to parenting behavior, per se, would be the most efficacious in terms of enhancing parenting. This finding raises many questions regarding the link between linguistic correlates of cognitive-affective models of relationships and their association with relationship behavior, and in so doing, may help direct future research and intervention.

Mediation of the link between self-focused RF and maternal sensitivity by positive feeling word use—In our final analysis, we tested a theoretical model presented in this article—that emotion language mediates the previously documented association between low self-focused RF and maternal insensitivity (Suchman, DeCoste, Leigh, & Borelli, 2010). We found that positive feeling word use acts as a partial mediator of this association. Because the study design was cross-sectional, we violate a central assumption of mediation models and are unable to ascertain the direction of causality. Our finding leaves open the possibility that emotion language is influenced by RF, which in turn exerts an effect on parenting, or alternatively, that RF is influenced by emotion language, which

then exerts an effect on parenting. On the basis of this analysis, however, we are able to conclude that self-focused RF and positive feeling use are overlapping constructs in their association with maternal insensitivity. Future research should examine this question using a longitudinal design.

Findings for negative emotion word use—Contrary to predictions, frequency of negative emotion word use was unrelated to any dependent variable examined in the study. Extant research examining the correlates of negative emotion word use has been scant and has yielded mixed findings, but there is some evidence for an association between depressive symptoms and more frequent negative emotion word use in college students' personal essays (Rude, Gortner, & Pennebaker, 2004) and more frequent sadness word use in college students' simulated diary entries (Rodriguez et al., 2010; but for null results, see Mehl, 2006). Although frequency of negative emotion word use was unrelated to maternal depressive symptoms in the current study, there was a negative correlation between positive feeling word use and maternal depressive symptoms. This is consistent with previous research that has documented a negative association between college students' depressive symptoms and positive emotion word use (Rodriguez et al., 2010; Rude et al., 2004) and also with a growing body of research that has suggested that depression is marked by deficits in positive emotional experience (for a meta-analysis, see Bylsma, Morris, & Rottenberg, 2008).

Here again, the context in which linguistic behavior occurs may be centrally important in interpreting these results. Given that the self-focused items on the PDI almost exclusively target negative emotional experiences, the frequency with which participants used negative emotion words may reveal less about their internal psychological state. For example, it is possible that sometimes mothers reflexively used negative emotion words (e.g., repeating the item words to the interviewer rather than engaging in reflection, especially if mothers were uncertain how to respond).[2] Limited variability in frequency of negative emotion words may therefore be an artifact of the measure that obscures meaningful differences in the use of negative emotion words.

Caveats

This study has several methodological limitations. The sample size is small and represents a self-selected group of mothers who were already enrolled in treatment for their substance use and seeking help with their parenting. The sample size may limit the power of the analyses to detect small and moderate effects, particularly in terms of the frequency of negative emotion word use. Future replication of these analyses with larger samples will be important. Mothers with substance-use disorders who have not enrolled in treatment and are not seeking help with parenting may reflect about and interact with their children differently than do those who are enrolled in treatment. In addition, without having comparable data from a nonclinical sample, it is hard to know in what ways the linguistic mechanisms identified in this study are unique to the population of substance-using mothers.

The cross-sectional nature of the data precludes interpretations about causation. Although we hypothesize that linguistic behavior is representative of internal models of emotion regulation that in turn drive behavior, it may be that certain parenting behaviors reinforce linguistic behavior or that linguistic and parenting behavior are mutually influential.

[2]Example of passage where mother uses negative emotion words, but is not reflective or open: **Interviewer:** "*And what gives you the most pain and difficulty in being a mother?*" **Mother:** "When I look around and I see … [sighs]. People, you know, kids with their grandmas and you know, fathers … that makes me feel like shit because he deserves to be able to see him at least a few times, you know? And it's hard."

Finally, LIWC does not account for negatives in speech. In other words, the same number of feeling words are counted in the statements "I'm not happy about it" (+1) and "I am happy about it" (+1). A different number of positive feeling words are counted in the statements "I am not happy" (+1) and "I am angry" (0). In other words, the number of positive and negative feeling words, respectively (regardless of context), is the variable of interest in the LIWC.[3] Although the LIWC system may overlook nuanced meaning in language, the difference between uttering an emotion word preceded by a negative and one not preceded by a negative remains unknown; it is striking that our effects were so strong despite this. Future research should attempt to disentangle the meaning of these linguistic nuances in parenting interviews.

Conclusions

Limitations notwithstanding, the preliminary findings reported here have several implications for future research. Positive feeling word use on the self-focused section of the PDI is associated with lower self-focused RF, greater self-reported recent substance use, and lower parenting sensitivity. Positive feeling word use partially mediates the association between self-focused RF and maternal insensitivity. This is the first study to examine linguistic behavior in the parenting narratives of substance-abusing mothers, and as such, represents a contribution to the field. Findings converge on the notion that among substance-abusing mothers, emotionally avoidant language (more frequent positive feeling word use) is associated with risk for parenting and self-dysregulation.

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[3]Example of passage where mother uses a negative before using the emotion word: **Interviewer:** "*Um, have you ever felt really angry as a mother?*" **Mother:** "No. Not really angry … stressed, but not angry." **Interviewer:** "*Mm hmm.*" **Mother:** "You can't get angry at your daughter. You can't."

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TABLE 1

Hypothesized relationship between reflective functioning, recent substance use, emotion regulation, and maternal sensitivity

Reflective Functioning	Substance Use	Emotion Language Word Use[a]	Sensitivity
High	Low	• Low positive feeling word use • High negative feeling word use *Have you ever felt like you really needed someone to take care of you? Can you tell me about a time in the last week or two when you felt this way?* Over like this weekend, past couple days, *uh huh*, …. And I guess it's my fault too because I hate a mess, so he knows that I will clean it. And that's what I talk to [therapist] about too, it gets me mad because my husband, like I said, he don't want to do nothing to help me, but yet, every time his mother calls, he runs and does all these things for her all the time. *Hmm.…. Hmm. How do you feel at that time, at those times?* Oh it gets me so mad. It—he tells me I'm jealous of his mother. I'm like, "I'm not jealous of her." I'm like, "these are things you should be doing your house first, besides, before over there." …[b] Word Frequency[c]: Positive Feeling Words = 1.60; Negative Emotion Words = 2.24	High
Low	High	• High positive feeling word use • Low negative feeling word use *Have you ever felt like you really needed someone to take care of you?* Someone to take care of me? Um hmm. Hmm. No.… I have ta teach that birdie [referring to child] ta fly. *Hm.* So, my concentration's on him. *Hmm. Okay.* Forget about my needs, right now. *Hm.* It's all about him. *Hm. Okay. How do you think, um, when you do feel like you need someone to take care of you, how do you think that that affects [child]?* I think it doesn't. Cause I, I give him all the attention that I can. *Hm.* Ya do it day by day, I don't know. I don't need nobody to take care a me. *Hm.* I don't. I just need myself. *Hm.* And I need myself to take care of [child]. *Hm.* So if I'm not good, then he ain't good. *Hm.* If I'm not happy, he ain't happy. *Hm.* So I just gotta, I gotta do what I gotta do. *Hm.* Y'know what I'm sayin'? Just, it don't bother me. Word Frequency[c]: Positive Feeling Words = .59; Negative Emotion Words = 3.07	Low

[a] Note that the self-focused section of the interview contains questions that probe the parent's intimate and negative emotional experiences related to parenting; therefore, in the context of being asked to discuss negative emotional experiences, using frequent positive feeling words and infrequent negative emotion words can be construed as emotional avoidance of the topic.

[b] Interviewer questions/comments included in italics. All interviewer utterances were removed from transcripts before they were subjected to Linguistic Inquiry and Word Count system analysis, but are included here for ease of interpretation.

[c] Word-count frequency levels here pertain to the mother's entire self-focused section of the Parent Development Interview, not the excerpt presented in this table.

TABLE 2

Sample Characteristics ($N = 47$)

Demographic Data	***M* (*SD*)**
Mother's age	30.13 (6.54)
Years of maternal education	12.34 (1.32)
No. of children	2.09 (1.27)
Child age (months)	17.68 (13.82)
Marital status	%
Never married	48.9
Cohabitating	19.1
Married	6.4
Separated or divorced	25.5
Race/Ethnicity	
Caucasian	70.2
African American	21.3
Hispanic origin	8.5
Unemployed	80.9
DCF Involved	59.6
Male child	51.1
Psychiatric Data	
Primary Substance	%
Opiate	72.3
Cocaine	12.8
Alcohol	6.4
Cannabis	8.5
Methadone-maintained	68.1
Used a substance during baseline month	24.4

	M (*SD*)	Clinical Cutoff[b]
Depression (BDI)	15.91 (9.29)	29.00
Global Psychiatric Distress (BSI)	*59.99* (11.02)	*63.00*
RF		
Self-focused RF	3.15 (.76)	3.00
Child-focused RF	3.36 (.62)	3.00
Maternal caregiving behavior (NCAST)		
Sensitivity to Cues	8.50 (1.39)	7.54

DCF = Department of Children and Families; BDI = Beck Depression Inventory; BSI = Brief Symptom Inventory; NCAST = Nursing Child Assessment Satellite Training Teaching Scales.

[a] Italicized scores represent T-scores.

[b] 1 *SD* below the mean in a normative sample of high-school-educated mothers.

TABLE 3

Pearson Correlations Among Covariates, Language Variables, and Dependent Variables [Mother's Self-Focused Reflective Functioning (RF), Recent Drug Use, and Sensitivity to Child Cues]

	BDI	Child Gender	Mother Age	Child Age	Positive Feeling	Negative Emotion	Mother RF	Recent Drug Use	Maternal Sensitivity to Cues
BDI	1.00	−0.01	0.26	0.21	−.34*	0.02	.33*	−0.03	0.05
Child Gender		1.00	−0.13	−0.12	0.06	0.16	−0.11	0.11	0.14
Mother Age			1.00	0.08	−0.20	−0.25	0.35*	−0.12	−0.01
Child Age				1.00	−0.37**	−0.07	0.24	−0.10	0.07
Positive Feeling					1.00	0.16	−0.57**	0.45**	−0.29*
Negative Emotion						1.00	−0.18	−0.01	−0.01
Mother RF							1.00	−.28*	0.27
Drug Use								1.00	0.05
Mother Sensitivity to Cues									1.00

BDI = Beck Depression Inventory.

*$p < .05$.

**$p < .01$.

TABLE 4

Hierarchical Linear Regressions Examining Associations Between Emotion Language Use, Self-Focused Reflective Functioning (RF), and Maternal Sensitivity

	Self-Focused RF		Maternal Sensitivity	
	δR^2	β	δR^2	β
Step 1	0.16*		0.01	
Child age		0.02		−0.03
Mother age		0.22		−0.08
Step 2	0.04		0.00	
BDI		0.08		−0.06
Step 3	0.20**		0.09*	
Positive feeling word use		−0.50**		−0.35*
Total $F(1, 43)$		6.66**		1.15

* $p < .05$.

** $p < .01$.

TABLE 5

Hierarchical Linear Regressions With and Without Positive Feeling Word Use as a Mediator in a Model for Maternal Sensitivity

	Without Mediation Test		With Mediation Test	
	δR^2	β	δR^2	β
Step 1	0.01		0.01	
Child age		−0.13		−0.03
Mother age		0.06		−0.13
Step 2	0.01		0.01	
BDI		−0.05		−0.08
Step 3	0.10*		0.03*	
Self-focused RF		0.35*		0.24*
Step 4			0.03	
Positive feeling word use	–			−0.23
Total $F(1, 43)$		−1.20		1.24

BDI = Beck Depression Inventory.

*$p < .05$.