Maternal reflective functioning, interpersonal violence-related posttraumatic stress disorder, and risk for psychopathology in early childhood

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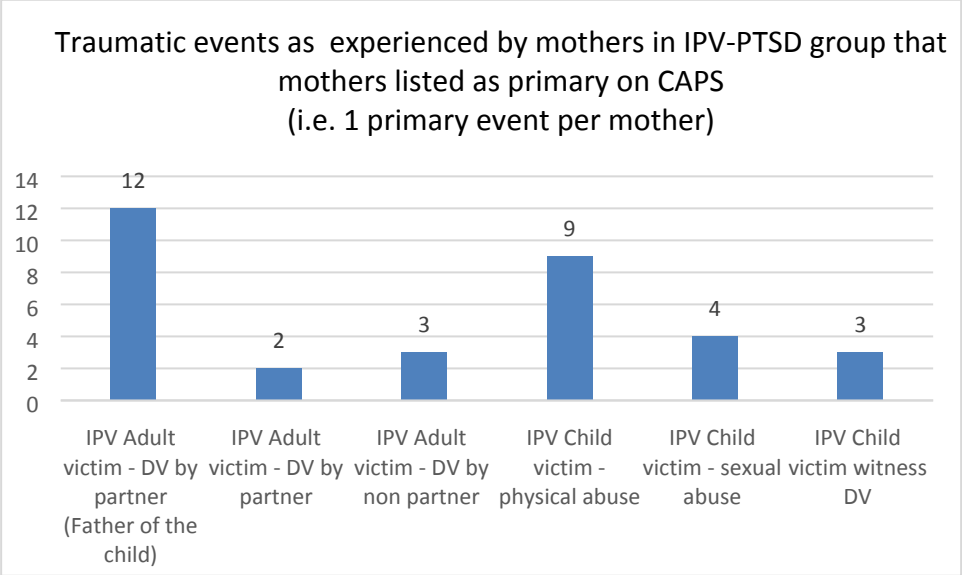
Figure 1. Traumatic events experienced by mothers on CAPS (IPV-PTSD group; $n = 33$)



Title: Maternal reflective functioning, interpersonal violence-related posttraumatic stress disorder and risk for psychopathology in early childhood

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Abstract

The aim of this study was to examine associations between maternal mentalization, interactive behavior and child symptoms in families in which mothers suffer from interpersonal violence-related posttraumatic stress disorder (IPV-PTSD). Fifty-six mothers and children (aged 12-42 months) including mothers with a diagnosis of IPV-PTSD were studied. Mentalization was measured by the Parental Reflective Functioning (PRF) Scale. Interactive behavior during free-play was measured via the CARE-Index. Child symptoms were measured by the Infant-Toddler Social and Emotional Assessment (ITSEA). Data analyses included non-parametric correlations and multiple linear regression. Results showed that lower IPV-PTSD and higher Maternal Reflective Functioning (MRF) were related to greater maternal sensitivity. Lower MRF and greater controlling behavior were related to child dysregulation. MRF was found to be lower in the subgroup of IPV-PTSD when the child's father was the perpetrator of IPV. Both MRF and interactive behavior are thus likely to be important targets for intervention during sensitive periods of early social-emotional development.

Introduction

Child-parent attachment as described by Bowlby (Bowlby, 1969) is a process that begins at birth, and one which depends on the caregiver's protection of the infant as supported by the infant's hardwired seeking of proximity to the caregiver. A secure, predictable attachment in which the infant feels protected, permits the infant's exploration and learning. An essential part of the attachment-process involves the caregiver's helping the infant and young child to regulate

his or her own emotions (Fonagy, Steele, Moran, Steele, & Higgit, 1991). Through early moment-to-moment interactions, the caregiver helps the infant to begin to make meaning of emotions in self and other and thus to up- and down-regulate his level of arousal (Hofer, 1984; Stern, 1985; Tronik and Gianino, 1986). This process of mutual parent-child regulation in the context of attachment leads to self-regulation by the age of 4 to 5 years (Tronik and Gianino, 1986).

Parental psychopathology, particularly when it involves parental emotional dysregulation, can impede parental availability to participate in mutual emotional regulation (Schechter et al., 2010; Tronick and Weinberg, 1997). Among potentially traumatic life-events, interpersonal violence (IPV) is particularly traumatogenic (Breslau et al., 1998). IPV, for the purposes of the present study, includes physical and/or sexual abuse or assault or exposure from childhood through adulthood (Widom, Czaja, & Dutton, 2008). Most IPV victims are women (Caldwell, Swan, & Woodbrown, 2012; Hien and Bukzspan, 1999); and IPV-related posttraumatic stress disorder (IPV-PTSD) prevalence is higher among females of childbearing age (Ditlevsen, Elklit, & 2010). It is, therefore, important to understand how IPV-PTSD may impact maternal caregiving and how such an impact might affect the child, particularly during sensitive periods of the development of emotion and arousal regulation before the age of 4 to 5 years.

The measurement of the impact of IPV-PTSD on the mother, who is most often the earliest primary attachment figure of the infant, is important both from developmentally- and relationally-based mental health perspectives. The recent literature defines affiliative bonds as "selective and enduring attachments", resulting in coordination of physiological and behavioral systems between partners (Hane and Fox, 2006). This coordination of the bio-behavioral systems underlying affiliative bonding serves as the foundation for healthy functioning relationships (Feldman, 2012).

Underlying this complex process of affiliative bonding are the psychobiological mechanisms that can be perturbed by maternal psychopathology as for example IPV-PTSD. Evidence shows that IPV-PTSD is strongly associated if not characterized by alteration of emotion and arousal dysregulation among adults (Frewen and Lanius, 2006) and thus among mothers of young children. This "psychobiological dysregulation" within and by the mother-child dyad has been studied in terms of emotional, behavioral, physiologic, and neuronal (i.e. corticolimbic) dimensions (Cordero et al., 2017; D. Moser et al., 2015; D. A. Moser et al., 2015; Schechter et al., 2017; Schechter, Moser, McCaw, & Myers, 2014).

Does maternal mentalization support mother-toddler mutual emotion regulation after violence exposure?

Mentalization refers to the capacity to infer and wonder about mental states that motivate behavior in self and others (Fonagy, et al., 1991). The capacity to mentalize is operationalized and measured as Reflective Functioning (RF). RF has been studied specifically as "Parental Reflective Functioning" (PRF; (Slade, 2005) and was conceived in order to refer to a parent's capacity to recognize mental states in oneself and one's child and to relate them to each other's behavior "in meaningful and accurate ways" (Slade, 2005, p. 275). PRF has been considered akin to the parent's ability to consider her child as a social agent (Sharp, 2008). The ability to make use of PRF with her child is facilitated when the parent has attained the capacity for self-regulation of emotion in the face of stress (Ensink, Begin, Normandin, & Fonagy, 2016a; Fonagy, Gergely, Jurist, & Target, 2002), and implies greater maternal sensitivity (Slade et al., 2005) and hence greater availability for participation in mutual regulation during parent-child interaction. This suggests that when PRF is high, it serves as a protective factor for child social-emotional development; and when low, can create a risk for the intergenerational transmission of insecure and/or disorganized attachment (Fonagy and Target, 2005).

Maternal reflective functioning (MRF)[1] has been found to be a protective factor during the postnatal period in that it subsequently predicts maternal sensitive behavior in parent-child interactions (Grienenberger, Kelly, & Slade, 2005; Pajulo et al., 2008; Rosenblum, McDonough, Sameroff, & Muzik, 2008). MRF has also been associated with greater reduction in the negative quality of maternal attributions (i.e. perceptions of the child's personality) among mothers with IPV-PTSD towards their toddlers following a brief videofeedback intervention (Schechter et al., 2006).

Among mothers who have experienced potentially traumatic experiences, MRF and sensitivity have been linked in several studies (Ensink, Normandin, Berthelot, & Fonagy, 2016; Stacks et al., 2014). Stacks and colleagues (2014) found that, among dyads mother-child (aged 16 months), mothers with histories of childhood maltreatment, MRF was positively correlated with both sensitive caregiving behavior and secure attachment of the child, and negatively correlated with parenting negativity (Stacks et al., 2014). This association was also found in the results of another recent study in which MRF was related to maternal sensitivity with the child (Ensink, Begin, et al. 2016). MRF was also significantly associated with maternal sensitive caregiving behavior following a brief attachment-based psychotherapy trial for substance-abusing mothers (Suchman et al., 2010)

Few studies to our knowledge have assessed the relationship and combined predictive value of PTSD and MRF specifically (Schechter et al., 2005a; Stacks, et al., 2014). Empirical results from at least one previous study did not find any significant associations between MRF and maternal PTSD (Schechter et al., 2005b). In this latter study participants were drawn from a sample of children ages 9-48 months that had been referred to an infant mental health clinic with concerns of maltreatment and/or risk for other IPV exposure. The majority of their mothers were found to have been suffering from IPV-PTSD. The relationship of maternal PTSD, MRF

[1] In this paper we refer to the named Parental Reflective Functioning capacity investigated in mothers, so the term "Maternal Reflective Functioning" (MRF) will be used.

and atypical maternal behavior was examined within the same sample and did not yield a direct connection between the three measures (Schechter et al., 2008). Rather, the quality of a mother's mental representations of her child was associated with both IPV-PTSD severity and MRF, and maternal mental representations were significantly associated with maternal behavior. Maternal behavior was coded for maternal disrupted communication, including frightening-frightened behavior, affective incongruence, withdrawal, and role-reversal. These aspects of maternal atypical behavior were measured by the Atypical Maternal Behavior Instrument or "AMBIANCE," which has been shown to be a robust indicator of caregiving behavior that poses risk for child disorganized attachment (Lyons-Ruth, Bronfman, & Parsons, 1999).

While no significant association has been found between maternal IPV-PTSD and MRF, Grienenberger and colleagues (Grienenberger, et al., 2005) did, however, find a robust negative correlation between MRF and maternal interactive behavior in a more normative inner-city sample also using the AMBIANCE. The latter study did not take maternal PTSD into account.

In summary, a review of the literature revealed strikingly few studies that examined the relationship between IPV-PTSD severity, MRF, and maternal interactive behavior.

The link between maternal PTSD and child psychopathology

The adverse impact of maternal IPV-PTSD on children has been found in several convergent studies (i.e. (Howell, 2011; Lannert et al., 2014; Narayan, Englund, & Egeland, 2013). Another study explored the effects of exposure to partner violence on women and their children and found that maternal mental health functioning was directly related to child psychopathology on the Child Behavior Checklist (Maddoux et al., 2016). Results of a recent study showed that the severity of maternal psychopathology among mothers who reported

experiencing IPV was associated with greater behavioral problems among toddlers (Easterbrooks, Katz, Kotake, Stelmach, & Chaudhuri, 2015).

A few studies have investigated the relationship between MRF and the development of child psychopathology (Ensink, Begin, et al., 2016a; Ensink, Begin, Normandin, & Fonagy, 2016b; Priel, Melamed-Hass, Besser, & Kantor, 2000; Smaling et al., 2017). For example, one such study found that low prenatal maternal RF was related to subsequent child physical aggression by maternal report (Smaling, et al., 2017). A statistical moderating effect was found on maternal intrusive behavior and the development of child aggression (Smaling, et al., 2017). Among 168 school-age children (7-12 years) with histories of sexual abuse, MRF was an independent predictor of child externalising symptoms (Ensink, Begin, et al., 2016a, 2016b).

Further studies of maternal IPV across the lifespan, taking into account related maternal PTSD severity, together with MRF are necessary to understand pathways towards psychopathology and the intergenerational transmission of violence and traumatic stress (Bosquet Enlow et al., 2014) .

In the present paper we have focused on the potential relationships between maternal IPV-PTSD, the quality of maternal interactive behavior with her very young child (ages 12-42 months), and MRF.

Study objectives and hypothesis

This study tested the following hypotheses:

1) MRF and IPV-PTSD will not be significantly associated with one another; since we expect that these variables imply the psychobiological involvement of two distinct systems: namely those of attachment and fear learning systems respectively.

2) Higher MRF will be associated with greater maternal sensitivity and less maternal controlling and unresponsive behavior. At the same time, more severe IPV-PTSD will be associated with less maternal sensitivity and more maternal controlling and unresponsive behavior.

3) Lower MRF and less sensitive maternal interactive behavior (i.e. greater controlling and unresponsive maternal behavior) will be associated with more severe child externalizing and internalizing symptoms, and greater behavioral dysregulation.

Method

Participants

Participant dyads were recruited between 2010 and 2012 after the study protocol was approved by the institutional review board of the Geneva University Hospitals. The study was performed in accordance with the Helsinki Declaration of Human Rights (World Medical Association, 1999).

Participants were recruited via flyers that were posted at domestic violence agencies and shelters as well as the Geneva University Hospitals and Faculties of Medicine and Psychology. Flyers were also placed at community centers, daycares, schools in the metropolitan Geneva area. These flyers listed the project coordinator's telephone number. The study was presented as a "Study about the impact of stress on the mother-child relationship." Mothers who called in with interest in participating were called back by a team member and then, after a scheduled screening session to determine eligibility, were enrolled to participate.

Inclusion criteria stipulated the following: that the participant parent must be the biological mother of her child and have lived with her child since birth and that children must be 12-42 months of age at the time of the videotaped mother-child behavioral observation.

Participants were required to be fluent in French or English. Exclusion criteria included the following: mothers must not be actively psychotic or substance abusing and their children must not be physically or mentally impaired in such a way that would prohibit full participation in study tasks.

Sixty-one participant dyads had complete data including MRF coding and were included in this 4-visit study that included a maternal interview, mother-child observation, fMRI session, and a trial intervention session involving clinician-assisted videofeedback exposure. This paper focuses on data obtained during the first 2 of these 4 visits only as further described below.

Sample description

Out of 61 participants for whom both ratings of MRF and maternal interactive behavior were available, 3 were excluded due to having a diagnosis of PTSD that was not violence related, and 2 were excluded due to being unreliable informants and outliers. Therefore 56 participants were included in this study.

Mothers

Out of 56 mothers, the majority (59%; n = 33/56) were married; most of the mothers (90%; n = 50/56) stated that they were involved in an intimate relationship with the father of the child or another partner at the time of participation.

Fifty-three percent (n = 31) of the mothers were employed at the time of their participation. Nearly half of the parental couples were of mixed cultures and languages: 48% (n = 27) of parents were bi-nationals (mother and/or biological father of the child being of more than one nationality). This multiculturalism reflects the demographics of the Geneva metropolitan area, in which 41,3% of the permanent resident population in 2014 had a non-Swiss nationality (*Office cantonal de la statistique*, 2017).

Children

Out of 56 children, 48% (n = 27) were boys and 52% (n = 29) girls. Forty-eight of the children participating were first born (n = 27) and 41 % second born (n = 23).

Procedure

As described in previous publications (Schechter, Suardi, et al., 2015), mothers and children participated in videotaped interviews and behavioral observations within 1 month of the screening visit.

During the 1st visit, mothers were interviewed about their mental representations of their child and their relationship with their child. Mothers then completed measures pertaining to their experience of a range of stressful life-events followed by structured psychiatric diagnostic interviews and a series of self-report questionnaires (i.e. ITSEA, Bracha et al., 2007).

The 2nd visit, 2-3 weeks later, involved mothers' participation with her child in a parent-child interaction procedure ("Modified Crowell Procedure"; Zeanah, Larrieu, Heller & Vallier, 2000). After this interaction procedure, mothers completed questionnaires about their child's socio-emotional development, life-events, attachment and psychopathology (i.e. symptoms and behaviors). Physiologic measures from mother and child were also performed during this second visit (Cordero, et al., 2017).

Mothers received 50 Swiss francs and a small toy or book for their child was offered for the participation in these 2 visits.

Measures

Socio-demographic variables

The Geneva Socio-Demographic Questionnaire (Sancho Rossignol et al., 2010) which was adapted from the Structured Clinical Interview for the DSM IV (First, Spitzer, Gibbon, & Williams, 1995) includes measurement of familial socio-economic status (SES) based on the Largo index (Largo et al., 1989).

Maternal Reflective Functioning (MRF) was assessed through the coding of transcripts of maternal narrative responses to the Working Model of the Child Interview (WMCI; (C. H. Zeanah and Benoit, 1995), which is a semi-structured interview assessing the caregiver's mental representations of her child and her relationship with her child. The WMCI was created with additional probes for PRF by Arietta Slade and the senior author in 1999 and was first administered in an abbreviated form that was approved by the WMCI authors and then reported along with related findings (Schechter et al., 2005). The current use of the full WMCI with the same PRF probes applied to its items was again approved by the WMCI authors (personal written communication from Charles Zeanah to senior author, documented on October 9, 2018), so as to permit effective MRF coding for the present study. Narrative responses from the WMCI with PRF probes is thus comparable to those from the Parent Development Interview (Aber, Slade, Berger, Bresgi, & Kaplan, 1985) and later PDI-Revised Version (Slade, Aber, Bresgi, Berger, & Kaplan, 2004) and accompanying PRF-PDI coding from which the PRF probes for the WMCI were derived (Schechter, et al., 2005b; Slade, 2005; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005).

For the purposes of PRF-PDI coding, videotaped interviews of the WMCI were transcribed. The PRF-PDI coding scale is a well-validated and reliable measure of parental child-focused mentalizing capacity that shares a nearly identical internal structure to the original adult-version of the Reflective Functioning Scale (Schiborr, Lotzin, Romer, Schulte-Markwort, & Ramsauer, 2013; Slade, Belsky, Aber, & Phelps, 1999; Taubner et al., 2013). MRF was scored from-1 to 9. MRF was independently and naively coded by two clinically-experienced clinical psychologists who had been trained to reliability at the Anna Freud Centre in London.

The inter-rater reliability was computed for 13 cases, 23% of the sample. Inter-rater reliability was excellent (ICC = .92).

Maternal Life-events experiences and Interpersonal Violence Exposure were assessed through two questionnaires: The Brief Physical and Sexual Abuse Questionnaire (BPSAQ(Marshall et al., 1998) and the Traumatic Life Events Questionnaire (TLEQ; (Kubany, Haynes, Leisen, Owens, Kaplan, Watson, et al., 2000). Full description of the BPSAQ scoring is described in a previous paper (Schechter, et al., 2005b). The Traumatic Life Events Scale (Kubany, Haynes, Leisen, Owens, Kaplan, & Watson, 2000) is a 22-items questionnaire assessing traumatic life-events that fulfill the A-criterion for validity for PTSD in the DSM – IV diagnosis.

Maternal Posttraumatic stress disorder (PTSD) was assessed via diagnostic interviews through the Clinician Administered PTSD Scale (CAPS; (Blake et al., 1995) and the Post-traumatic Symptoms Checklist-Short version PCL-S (Weathers, Keane, & Davidson, 2001; Yao et al., 2003) to assess current PTSD symptoms. The internal consistency for all CAPS items has been supported by a Cronbach's alpha of 0.97 (Pupo et al., 2011), and that of the PCL-S by a Cronbach's alpha of 0.94 (Wilkins, Lang, & Norman, 2011). Consideration of both CAPS and PCL-S scores were considered for the categorical analysis: mothers with a CAPS score at or above 55 and the PCL-S score at or above 40 were included in the full-diagnosis clinical group. Subjects that were sub-threshold for diagnosis yet who were deemed by the research clinician to have clinically significant symptoms had to have had a CAPS score of 30-54 and PCL-S score of 25-40. For the purposes of categorical analyses, sub-threshold and full-diagnosis groups were combined into a clinical group vs. non-PTSD controls to gain statistical power in categorical analyses.

In the sample, maternal IPV-PTSD was primarily related to IPV at the hands of an intimate partner rather than non-violent events. Life-events upon which the CAPS and PCL-S were based for PTSD diagnosis are described in Figure 1.

[Insert *Figure 1*]

Maternal Alexithymia was assessed using the well-validated French-language version of the Toronto Alexithymia Scale (TAS-20) which consists of 20 items (Bagby, Parker, & Taylor, 1994; Loas, Parker, Otmani, Verrier, & Fremaux, 1997). Analysis of internal consistency for the TAS-20 French version was acceptable, with a Cronbach's alpha at 0.74. The subscale alpha scores were 0.78 and 0.67 respectively, for the two first subscales, (ability to identify feelings and ability to describe feelings), yet lower and not acceptable (a=0.33) for the last subscale (externally oriented thinking) (Pinaguy, Chabrol & Barbe, 2002).

Mother-child interactive behavior was assessed via the CARE-Index (Crittenden, 2006). The Care-Index has been successfully used for the evaluation of interactive behavior of parents and maltreated children (Crittenden, 1992; Crittenden and Bonvillian, 1984). Statistical properties of the Care-Index measures (i.e. for the measurement of maternal sensitivity) within a population of toddlers and preschoolers have shown the measure to have validity and good inter-rater reliability (Künster, Fegert, & Ziegenhain, 2010; Pajulo et al., 2012; Tryphonopoulos, Letourneau, & Ditommaso, 2014; Udry-Jørgensen et al., 2011).

The CARE-Index involves coding 5-minutes of videotaped caregiver-child play interaction with separate subscales for caregiver behavior and child behavior. For caregiver behavior, the coder rates specific aspects of interactions such as the adult's ability to comfort the child, the caregiver's receptivity to parent-child turn-taking, shared pleasure, joint attention, non-verbal and verbal negotiation and reciprocal communication. Caregiver sensitivity to the infant's social-emotional signals is an important focus of the caregiver coding scheme. Specific behavioral items considered during the coding include seven dimensions of interactive behavior: facial expression, vocal expression, position and body contact, expression of affection, turn-taking (within bouts of play), control (between bouts of play), and choice of activity. For each, there are three types of caregiving behavior dimensions: sensitive,

controlling, unresponsive. Only caregiver behavior variables are reported in this study, in response to the stated a-priori hypotheses.

Dimensional scales range from 0 to 14: for example, for maternal sensitivity, 0 being "insensitive", 7 being "normally sensitive" and 14 being "outstandingly sensitive." The CARE-Index was independently and naively coded by two clinically-experienced clinical psychologists who had been trained to reliability. Inter-rater reliability was excellent (ICC = .92). Disagreements for the remaining 8% of cases with discordant ratings were discussed and a best estimate was entered into the database.

Maternal report of child functioning

Child psychopathology was evaluated dimensionally via the Infant-Toddler Social-Emotional Assessment (ITSEA; (Bracha et al., 2007; Briggs-Gowan and Carter, 1998; Carter and Briggs-Gowan, 2000; Carter, Briggs-Gowan, Jones, & Little, 2003). The ITSEA is a well-validated and reliable parent report questionnaire that evaluates early childhood symptoms, problematic behaviors and competencies from ages 12 to 48 months. It is composed of 168 items along 17 sub-scales that are grouped into three broad pathological domains: externalizing behaviors, internalizing symptoms, and dysregulation (cf Table 2). Competency subscales were not included in analyses for this study. Internal consistency of the ITSEA has been analyzed and has been measured by an overall Cronbach's alpha between 0.85-0.89. Individual subscales coefficient alphas ranged between 0.66 and 0.79 for the externalizing subscales, between 0.52 and 0.73 for the internalizing subscales, and between 0.62-0.83 for the dysregulation subscale (Briggs-Gowan & Carter, 2007).

[Insert *Table 1*].

Data Analysis

Data analyses were performed using SPSS software, version 22 (IBM Corp., Aronk, NY, USA).

We first tested whether MRF and PTSD were significantly correlated with one another. We then tested whether MRF was linked to maternal sensitivity and explored how IPV-PTSD affected, if at all, this association.

In a first analysis, we correlated MRF to maternal interactive behavior: maternal sensitivity, controlling and non-responsive behavior. If correlations were significant, we repeated this analysis within each group (IPV-PTSD and non-PTSD) to find out if the effect was primarily driven by one or the other group. Additionally, we performed a multiple linear regression with both MRF and IPV-PTSD severity as predictors to test how these two variables together might contribute to the model.

We then performed a correlational analysis between the MRF and child symptom severity; namely within the internalizing, externalizing and dysregulation subscales of the ITSEA. In the case of finding a significant effect we performed post hoc analysis similar to step 1 (i.e. correlation split for each group and regression with PTSD as an additional predictor). Following that, we correlated maternal interactive behavior with child symptoms. Whenever a child symptom was correlated with both MRF and a maternal interactive behavior, we performed a regression with child symptoms as a dependent variable in order to understand the effects of MRF and maternal interactive behavior on the variance of child symptoms.

We additionally explored in post-hoc analyses via Student t-tests the differences between mothers suffering from IPV-PTSD for whom the experience of IPV involved the father of the child as the perpetrator of IPV (PTSD-F, $n = 12$), as compared to IPV-PTSD mothers for whom the experience of IPV did not involve the child's father (PTSD-nonF, $n = 21$). Those two groups did not differ on any demographic measure we tested (Socio-economic status, age, age

of child, gender of child) nor significantly in the amount of PTSD symptoms they displayed, despite a trend towards more severe IPV-PTSD when the father was the perpetrator (mean CAPS; PTSD-F = 95.3, PTSD-nonF = 85.0, t(31)= 1.98, p = .057).

Results

1) Testing Hypothesis 1: MRF and PTSD were not significantly associated with one another.

In order to understand if the nature of the traumatic exposure independent of PTSD status might impact the level of MRF, we performed additional post-hoc analyses with mothers who had IPV-PTSD only (n = 33). We used t-tests to investigate whether MRF might be linked to whether the perpetrator of IPV was the child's father or another partner or family member of the child's mother (PTSD-F n = 12, PTSD-nonF = 19). We found that mothers who suffered from IPV-PTSD-F had a significantly lower level of MRF (mean: PTSD-F = 3.83, PTSD-nonF = 4.62, t(30) = 2.17, p = .042), and lower maternal sensitivity than those mothers who suffered from IPV-PTSD-nonF, albeit at a trend-level of significance (mean: PTSD-F = 4.42, PTSD-nonF = 5.43, t(30) = 2.01, p = .053).

2) Testing Hypothesis 2: Results of our analysis showed that MRF correlated significantly with maternal sensitivity in the overall sample (r = .36, p = .007), a relationship that was not significantly different between the groups (non-PTSD: r = .33, IPV-PTSD r = 34). A regression model with maternal sensitivity as the dependent variable was significant (R^2 = .24, p <.001) and showed that both PTSD symptoms (β = -.33, p = .008) and MRF (β = .33, p = .008) equally contributed to maternal sensitivity. Neither alexithymia nor any of the other tested control variables (SES, age, child gender, child age) significantly changed this regression.

MRF significantly correlated with neither maternal controlling nor maternal unresponsive behavior.

3) Testing hypothesis 3: Interpersonal Violence related Post-Traumatic Stress (IPV-PTSD), Maternal Reflective Functioning (MRF), maternal behavior and Child outcomes.

MRF correlated with all tested child symptom measures, (dysregulation: r = -.36, p = .009, internalizing symptoms: r = -.31, p = .030, externalizing symptoms: r = -.31, p = .037). In order to find out which group (IPV-PTSD or controls mothers) drove this effect, we then investigated these correlations within each group. We found that the IPV-PTSD group was the primary driver of all these correlations of MRF and child symptoms (externalizing: IPV-PTSD: r = -.40, p = .049, Non-PTSD: r = -.18, p = .428; internalizing: IPV-PTSD: r = -.40, p = .035, Non-PTSD: r = -.07, p = .744; dysregulation: IPV-PTSD: r = -.43, p = .021, Non-PTSD: r = -.21, p = .348).

We then tested a linear regression model to investigate within the IPV-PTSD group whether IPV-PTSD symptom severity significantly increased the explained variance between MRF and child symptoms. This was the case for dysregulation (R^2 = .37 p = .003, MRF: β = -.47, p = .006; IPV-PTSD symptom severity: β= .43, p =.012).

Maternal controlling behavior significantly correlated to child externalizing symptoms (r = -31, p = .033). We additionally tested a regression model investigating the combined influence of MRF and maternal controlling behavior on child externalizing symptoms. That model was significant (R^2 = .16, p = .021), and suggested that both MRF and controlling behavior contributed similarly but not significantly to the regression model (MRF: β = -.26, p =.077, controlling behavior: β = .27, p = .068).

Maternal interactive behavior was not correlated with child internalizing symptoms.

We then investigated whether maternal interactive behavior also associated with child dysregulation symptoms and found that it was indeed correlated to maternal controlling behavior (r = -.36, p = .009) and maternal sensitivity (r = -.30, p = .036).

We then investigated via multiple linear regression, the individual contributions of MRF and a mother's sensitive and controlling behavior toward her child during the interaction to child symptoms and behaviors on the ITSEA. Results showed that maternal sensitive behavior did not contribute significantly to the model and was thus removed. We then found that across the entire sample, both MRF and maternal controlling behavior were associated with child dysregulation (overall: $R^2 = .22$, $p = .003$; MRF: $\beta = -.30$, $p = .024$, maternal controlling behavior: $\beta = .31$, $p = .023$).

[Insert *Table 2*]

[Insert *Table 3*]

Discussion

This study examined the links between a marker of attachment security and organization (MRF) and a form of maternal psychopathology (IPV-PTSD), as supportive and perturbing, respectively, of maternal and therefore mutual maternal-child emotion regulation. Secondly, this study examined the possible role of MRF and IPV-PTSD as predictors of a) maternal behavior, such as maternal sensitivity to child emotional communication during play and b) child symptoms and behaviors indicative of risk for subsequent developmental psychopathology.

With respect to our first hypothesis and consistent with the literature (Stacks, et al., 2014), we found no significant association between IPV-PTSD and MRF. While not studied explicitly in the present study, one could infer from the literature that higher MRF reflects a more secure/autonomous state of mind: In the present study, maternal sensitive caregiving is

significantly associated with higher MRF, and in prior studies, with maternal AAI classification as secure/autonomous (Slade, et al., 2005; Suchman, DeCoste, Leigh, & Borelli, 2010). We thus consider MRF to be supportive of maternal and mutual maternal-child emotion; in that MRF functions as a marker for maternal secure/autonomous maternal attachment classification.

In exploratory analyses, we did find that at least one aspect of the mothers' traumatic experience resulted in significantly lower MRF; namely if the child' father as opposed to another romantic partner or family member perpetrated the IPV, then mothers had significantly lower levels of MRF and lower levels of maternal sensitivity at a trend-level of significance.

While it is beyond the scope of this study to do more than speculate as to why this might be the case, we wonder if this finding might be linked to a relationship-specific phenomenon; namely, MRF was coded from mother's narrative responses about her child who, in this instance, is also the child of the perpetrator of IPV. Previous studies have found that mothers view their children more negatively if they perceive a resemblance physically or in terms of the child's personality to the perpetrator of IPV (Schechter, Kaminer, Grienenberger, & Amat, 2003; Schechter, et al., 2006). With this in mind, a psychotherapist can better target a mother's relationship with her child when the child him- or herself becomes a reminder of the perpetrator, and, therefore, a potential trigger of maternal IPV-PTSD. More specifically, clinical implications in this context would include: 1) stimulation and modelling of effective MRF and 2) reduction of traumatized mothers distinguish between the adult perpetrator of past IPV (i.e. her child's father) and her present young child in his or her own developmental and relational context (Schechter et al., 2006).

In a safe therapeutic context, those feelings and maternal perceptual bias of child distress with over-reading of controlling-anger states (i.e. as opposed to helpless-fear states) can emerge. Discovering how child emotional communication can become a trigger of maternal PTSD is a central therapeutic technique used Clinician-Assisted Videofeedback Exposure Sessions (CAVES) and related CAVES-Approach Therapy (CAVEAT) (Schechter, et al.,

2006). Furthermore, results of the present study bear similarity to those of Ensink and colleagues concerning mothers with histories of child maltreatment (Ensink, Berthelot, Bernazzani, Normandin, & Fonagy, 2014). Ensink and colleagues did not find as much diminished maternal capacity for RF as much as « total collapse » of RF when mothers spoke about their maltreatment histories and related attachments to the caregivers.

Maternal Reflective Functioning (MRF) and maternal interactive behavior

In support of our second hypothesis, we found a significant, positive correlation between MRF and maternal sensitivity as coded during mother-child play interactions (using the CARE-Index coding). This result is consistent with findings from multiple studies in the literature (Grienenberger, et al., 2005; Rosenblum, et al., 2008; Smaling, et al., 2017; Stacks, et al., 2014). Both lower MRF and greater severity of maternal IPV-PTSD were predictive of mothers behaving less sensitively during play with their child. This finding also is consistent with previous findings showing that lower MRF and greater severity of maternal IPV-PTSD were associated with less "balanced" maternal mental representations (Schechter et al., 2005), less change of negative attributions following single-session of CAVES (Schechter et al., 2006).

Results from the present study indicate further that MRF together with maternal IPV-PTSD are both orthogonal predictors of maternal sensitivity (in the sense that the parts of the variance that predicted maternal sensitivity were different between maternal RF and IPV-PTSD).

In light of the association that we found between IPV-PTSD and maternal interactive behavior, the results of the present paper echo and extend previous findings (Lyons-Ruth, 1996a, 1996b; Schechter et al., 2008; Schechter, Moser, et al., 2015; Schechter, Suardi, et al., 2015). Namely, this study demonstrated a significant and positive association between maternal IPV-PTSD and maternal controlling (i.e. intrusive) behavior, a form of non-sensitive maternal behavior during play with her toddler.

We further extended these findings in the present paper by having shown that maternal controlling behavior is significantly and positively associated with child emotional and behavioral dysregulation on the ITSEA dysregulation subscale. Interestingly, only maternal controlling behavior and not maternal sensitive behavior (i.e. inversely) was correlated with child dysregulation on the ITSEA. This latter finding is consistent with observations by Grienenberger and colleagues (2005) who wrote that "aggressive and intrusive or fearful and withdrawn behaviors as well as miscommunications and misattunements, may be more likely than maternal sensitivity to be critical in intergenerational transmission of attachment" (Grienenberger et al., 2005, p. 307).

MRF measured prenatally, of interest, was also linked to child outcomes in presence of maternal intrusiveness (Smaling, 2017) with a similar association between MRF (assessed prenatally) and child aggressive behavior in that study. Our results thus echo those of Smaling and colleagues (2017), with respect to MRF and the presence of child symptomatology in light of an important contribution of maternal interactive behavior to this model (i.e. measured as "maternal intrusiveness" in Smaling study, and as "maternal controlling behavior" in our study).

This latter finding highlights the risk associated with controlling, hostile-intrusive caregiving behaviors in relation to maternal IPV-PTSD. In the present study, we did not find a significant association of maternal unresponsiveness with maternal RF or child symptoms at this level of analysis.

The present study highlights the need to take into account maternal IPV-PTSD when examining the effects of trauma such as IPV on parent-child interactions and subsequent child psychopathology. This paper underlines the notion that experiencing a potentially traumatic event in life such as IPV, as traumatogenic as it is, does not in and of itself, mean that a mother with history of IPV will a) suffer from PTSD and b) show less maternal sensitivity or greater controlling behavior. For this reason, the present paper supports that the addition of PTSD

measurement is needed in further research that explores the effects of parental trauma and its interaction with PRF or other indicators of attachment security and organization.

In support of our third hypothesis, results showed that both MRF and maternal controlling behavior were significantly associated with dysregulated child behavior on the ITSEA. MRF was, in fact, negatively correlated with all three subscales of child symptoms and behaviors (measured on the ITSEA): internalizing, externalizing, and dysregulation. In order to understand the contribution of maternal reflective functioning and interactive behavior to the prediction of child symptoms, we looked at the effects of maternal behavior on child symptomatology. Both MRF and maternal controlling behavior, but not the degree of maternal sensitivity (on the CARE-Index measure), were predictive of child symptom-severity. We wondered why maternal controlling behavior and not sensitive behavior, which is strongly, negatively correlated with controlling behavior, was the only significant maternal behavioral correlate of child psychopathology on the ITSEA. In response, at least one paper argued that maternal sensitivity as a form of "positive parenting" may be less predictive of psychopathology than "negative parenting" (i.e. hostile, intrusive, controlling behaviors) (Schoenmaker et al., 2015).

Since PTSD is a disorder of psychobiological dysregulation that affects both emotion and behavior, we expected a link between maternal IPV-PTSD and child dysregulation on the ITSEA, a subscale that includes both dysregulated emotion (i.e. negative emotionality) and behavior (eating and sleeping behavior and sensory sensitivity) as was the case. Yet our results were also consistent with those of Ensink and colleagues (2016) for children (aged 7 -12 years) who were victims of child sexual abuse. That paper showed that MRF was an independent predictor of child externalizing symptoms (Ensink, Begin, et al., 2016a, 2016b). The present study thus highlights the clinical implication that intervention should likely be focusing on three domains: 1) support and modeling of MRF, 2) treatment of IPV-PTSD, 3) and work on maternal-child interactive behavior.

Limitations

The present study was limited by some factors that must be taken into account: the child psychopathology measures depended on maternal report via a self-report questionnaire - albeit a reliable, well-validated one, about her child's symptoms and behaviors - and did not include child observational measures, clinical interviews of the mothers, child observational measures or daycare/preschool instructor reports. That having been noted, the literature reports that at least for externalizing and dysregulated (i.e. "concrete and observable") behaviors among school-age children (aged 6 to 16), maternal and child reports did not significantly differ (Herjanic and Reich, 1982). For preschool-age children, another study found that parents' inter-rater reliability was good for the ITSEA and that the ITSEA showed convergent validity with other parental-report questionnaires (Visser et al., 2010). Finally, mothers were found to be reliable informants as compared to clinician and teacher ratings for the diagnosis of attention deficit hyperactivity disorder (ADHD) among school-age children (ages 6-17) (Faraone, Biederman, & Milberger, 1995), as well as for sleep disturbances (Martinez et al., 2014).

We were unable to include fathers as informants in this study due to ethical constraints imposed by the fact that many of the IPV-PTSD affected mothers had orders of protection and/or had sought anonymity and shelter protection from their violent partners. Additionally, our sample-size did not permit consideration of more complex statistical models that might, in future studies with a larger sample-size, tease apart the effects of violence-exposure in mothers and children as related to measures of maternal-child interactive behavior and child psychopathology, and that would also take into account possible child-gender effects (Grasso, Ford, & Briggs-Gowan, 2013).

Another potential limitation of this study is due to the difficulty in obtaining additional reliable measures about the child's possible experience of maltreatment since we relied on maternal report without a parallel informant.

Clinical implications

Our results have shown that both MRF and maternal interactive behavior must be taken into account for purposes of assessment and clinical intervention. Mentalization-based intervention (Sadler et al., 2013; Suchman, Ordway, de Las Heras, & McMahon, 2016) as well as relationship-based parent-child psychotherapeutic intervention focused on parent-child interactions have both shown promising results (Lieberman, Ghosh Ippen, & Van Horn, 2006; Pajulo, et al., 2012; Rusconi Serpa, Sancho Rossignol, & McDonough, 2009; Tereno et al., 2017). Combining these approaches for interpersonal violence exposed mothers with PTSD, with further integration of specific techniques to address PTSD-related symptomatology and dissociation would likely maximize the chance of positive outcomes in violence-exposed mothers and their children.

Conclusions

Given the risk of intergenerational transmission of trauma and related psychopathology among mothers who are exposed to interpersonal violence, careful assessment and focused intervention are indicated as early as possible in the context of child-parent attachment. The results of this study support that evaluation and intervention that targets MRF and the quality of parental-child interactive behavior (i.e. maternal sensitivity and controlling behavior) in order to reduce child emotional and behavioral dysregulation over time.

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Table 1. Domains of the Infant-Toddler Social and Emotional Assessment (ITSEA; Carter et al., 2003)

Domains of the ITSEA	*ITSEA Scales and number of items investigated*
1) Externalizing domain (24 items)	Activity/impulsivity (6 items) Aggression/defiance (12 items) Peer aggression (6 items)
2) Internalizing domain (30 items)	Depression/withdrawal (9 items) General anxiety (10 items) Separation/distress (6 items) Inhibition to novelty (5 items)
3) Dysregulation domain (34 items)	Sleep (5 items) Negative emotionality (13 items) Eating (9 items) Sensory sensitivity (7 items)

Table 2. Group comparisons (maternal IPV-PTSD vs non-PTSD) of descriptive and other measures.

Abbreviations: CAPS = Clinician Administered PTSD Scale; ITSEA = Infant-Toddler Social and Emotional Assessment , PCL-S = Posttraumatic Symptoms Checklist-Short version, TAS-20 = Toronto Alexithymia Scale, PRF = Parental Reflective Functioning

Maternal Measure				
	IPV-PTSD Mothers (n = 33)	Non-IPV-PTSD Mothers (n = 23)	T-score / chi-square	Significance
Age in Years	33.2 (5.8)	34.6 (5.7)	-1.49	0.142
Socio-Economic Status (low scores = high status)	6.09 (2.1)	4.30 (1.9)	3.22	0.002
Maternal Reflective Functioning (PRF Scale)	4.33 (1.08)	4.57 (0.66)	-0.92	0.364
Maternal sensitivity (CARE-Index)	5.06 (1.46)	6.00 (1.04)	-2.65	0.011
Maternal controlling behavior (CARE-Index)	3.33 (1.71)	2.22 (1.24)	2.68	0.010
Maternal unresponsive behavior (CARE-Index)	2.91 (1.77)	2.30 (1.49)	1.34	0.187
Maternal PTSD Symptoms (CAPS Score) Lifetime	88.7 (18.8)	18.2 (5.5)	17.4	<0.001
Maternal PTSD Symptoms (PCL-S Score) Current	44.2 (8.6)	16.5 (0.8)	15.4	<0.001
Alexithymia (TAS-20)	47.03 (17.56)	39.77 (14.54)	2.17	0.035
Child Measures				
% Boys	48%	48%	0.002	1.000
Childs Age in Months	27.5 (9.1)	26.7 (8.3)	0.325	0.746
Externalizing Symptoms (ITSEA)	0.65 (0.32)	0.57 (0.41)	0.71	0.484
Internalizing Symptoms (ITSEA)	0.52 (0.15)	0.45 (0.17)	1 .57	0.124
Dysregulation (ITSEA)	0.60 (0.23)	0.54 (0.25)	0.97	0.337

Table 3. Correlation matrix of maternal and child measures. * indicates significance at an uncorrected level of p<0.05, ** p<0.01. Values to the left of the black diagonal are correlation values for the entire sample. Values to the right of the black diagonal indicate correlation values when the sample is constrained to dyads where the mother suffered from interpersonal violence related posttraumatic stress disorder. Abbreviations: PTSD = Posttraumatic Stress Disorder.

	Variable	1.	2.	3.	4.	5.	6.	7.	8.
Maternal Variables	1. Parental Reflective Functioning		.344*	-.232	-.196	.093	-.399*	-.435*	-.397*
	2. Sensitive Behavior	.359**		-.549**	-.542**	-.159	-.120	-.258	-.127
	3. Controlling Behavior	-.193	-.588**		-.217	.170	-.121	.323	.197
	4. Unresponsive Behavior	-.231	-.580**	-.116		.023	.202	-.055	.016
	5. PTSD symptoms	-.086	-.359**	.365**	.177		-.063	.385*	.324
Child Symptoms	6. Internalizing	-.307*	-.216	.016	.183	.200		.422*	.541**
	7. Dysregulation	-.364**	-.298*	.367**	-.021	.221	.488**		.733**
	8. Externalizing	-.309*	-.248	.316*	.015	.164	.507**	.755**	