Child Psychiatry Hum Dev (2015) 46:406–417
DOI 10.1007/s10578-014-0480-4

ORIGINAL ARTICLE

How do Maternal PTSD and Alexithymia Interact to Impact Maternal Behavior?

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Published online: 10 July 2014

Abstract Maternal interpersonal violence-related post-traumatic stress disorder (IPV-PTSD) is known to be associated with impairment of a mother's capacity to participate in mutual emotion regulation during her child's first years of life. This study tested the hypothesis that maternal difficulty in identifying feelings in self and other, as an important dimension of the construct of alexithymia, together with maternal IPV-PTSD, would be negatively associated with maternal sensitivity. Maternal sensitivity to child emotional communication is a marker of maternal capacity to engage in mutual regulation of emotion and arousal. Following diagnostic interviews and administration of the Toronto Alexithymia Scale, 56 mothers and their toddlers (ages 12–42 months) were filmed during free-play and separation/novelty-exposure. Observed maternal sensitivity was coded via the CARE-Index. Maternal IPV-PTSD severity, difficulty in identifying emotions, and lower socio-economic status were all associated with less maternal sensitivity, and also with more maternal controlling and unresponsive behavior on the CARE-Index.

Keywords Violence · Post-traumatic stress disorder (PTSD) · Emotion regulation · Alexithymia · Parenting · Infancy and early childhood

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Introduction

Violence exposure is among the most traumatogenic types of life events. Interpersonal violence (IPV) which includes adult physical and/or violent assault in addition to comorbid childhood exposures to physical and/or sexual abuse and/or domestic violence, is associated with a prevalence rate of post-traumatic stress disorder (PTSD) as high as 80–90 % [1]. The nature and course of interpersonal violence-related PTSD (IPV-PTSD) is often "complex" and chronic [2, 3].

PTSD, regardless of the type of traumatic event, most often affects women of childbearing age; the prevalence ratio of women to men is as high as 3:1 [4]. Given that the demographics of IPV-PTSD include a large number of potential and actual mothers of infants and young children, it is imperative that researchers consider the effects of the disorder on the mother–child relationship and on the social-emotional development of the infant and young child in order to prevent subsequent negative effects on child development.

The portion of childhood during which one refers to the child as "a toddler", ages 1–3 years, is an especially sensitive developmental period during which the child depends on mutual regulation of emotion and arousal with his caregiver. He also depends on his caregiver's capacity to set limits with normative exploratory, instrumental, and

hostile aggression for healthy social-emotional development and the foundation of self-regulatory capacities that permit the child to enter kindergarten by age 4–5 years [5, 6]. When maternal psychopathology interferes with maternal availability towards these ends, there is a greater risk for subsequent development of conduct disorder, auto-aggressive behavior and other psychopathology that may well contribute to intergenerational transmission of violence and related trauma [5, 7, 8]. This is especially salient when the child's father has been violent and thus the child must depend even more on his attachment to the mother for a sense of security, and as a model for prosocial behavior. The latter can become particularly difficult if the child's mother herself does not feel secure and remains hypervigilant to potential attack, such that she cannot assist her toddler in reading and responding to his emotional communication as is necessary for supporting emotion regulation. Her behavior would thus likely reflect diminished sensitivity [9, 10].

Maternal sensitivity was first defined by Mary Ainsworth ([11], p. 2) as "the mother's ability to perceive and to interpret accurately the signals and communications implicit in her infant's behavior, and given this understanding, to respond to them appropriately and promptly". Ainsworth identified four "essential components" of maternal sensitivity that could be measurable by her maternal sensitivity scales: (a) her awareness of the infant's signals; (b) an accurate interpretation of them; (c) an appropriate response to them; and (d) a prompt response to them. Many mothers with demonstrably low sensitivity to their child's emotional communication also had histories of exposures to family violence, abuse, and neglect. Lyons-Ruth and Block [12] first showed that similarly "at-risk" mothers' severity of PTSD symptoms was inversely related to the degree of sensitive caregiving behavior (i.e. intrusive and aggressive behavior towards the child, as well as avoidant and withdrawing behaviors). We set out to replicate and extend their findings in order to understand how IPV-PTSD mothers might affect their toddlers and how their toddlers might affect them in terms of mutual regulation of emotion and arousal [13].

IPV-PTSD mothers have reported difficulties with respect to the reading and interpretation of their child's emotional communication [14]. In particular, a confusion between negative emotions involving high-arousal has been noted, namely, a confusion between fear and anger [13, 14]. This particular form of confusion, we posited could be screened with measures of alexithymia. This idea is further supported by the reported association between alexithymia and complex PTSD [15].

Alexithymia was first described as a personality trait or psychological deficit in which affected individuals have trouble distinguishing and appreciating others, thus leading to less empathic responsiveness [16]. The question has emerged as to whether this apparent trait might, among patients with PTSD, actually represent an aspect of this disorder's emotional numbing and dissociation [17]. Alexithymia has specifically been shown to be associated with emotional numbing as a way of avoiding painful trauma-associated memory-traces among patients with IPV-PTSD and burn- and accident-related PTSD [18, 19]. These findings support the interpretation that alexithymia can represent a psychological consequence of traumatization in some individuals [18, 20]. Yet studies have also suggested that, independent of any specific form of psychopathology, individuals with alexithymic traits show distinct patterns of neural activity in response both to visual stimuli depicting facial expression as well as auditory stimuli composed of angry, surprised, and neutral prosody [21]. Maternal alexithymia may therefore also represent a pre-morbid or "primary" trait that can be a risk-factor for traumatization and re-traumatization, perhaps linked to an early sensitive developmental period in the context of attachment [22].

Many early disturbances of attachment are frequently comorbid with childhood histories of interpersonal violence exposure, and many women who go on to become victims of interpersonal violence in adulthood have such a history. Because of this, anything short of a prospective longitudinal study would not definitively be able to answer the question as to whether alexithymia is more of a psychological defense in the context of PTSD or a marker of an early attachment disturbance [23].

Recent research supports that specific alexithymic errors in identifying and distinguishing "fear" from "anger" are likely salient and related to the negativity and distortion of maternal attributions that inform empathic maternal responsiveness to her child [24]. Further research is therefore needed in order to examine the link between maternal difficulty identifying emotion and mothers' sensitive caregiving behavior with their toddlers. Given the dearth of literature that examines maternal sensitivity and its relationship to PTSD and alexithymia, we decided to focus on this question in the present study.

We hypothesized the following:

1. The diagnosis and severity of traumatized mothers' posttraumatic stress, in particular, their avoidance/emotional numbing would be significantly associated with mothers' difficulty in correctly identifying others' emotions (i.e. "feelings").
2. This maternal difficulty would be negatively associated with maternal sensitivity since, given this alexithymic difficulty, one would expect an affected mother to have trouble identifying her child's and her own feelings.

3. We hypothesized, therefore, that greater maternal difficulty identifying feelings in self and other would together with maternal IPV-PTSD be associated with less maternal sensitivity than either predictor alone.

Methods

Participants and Procedures

The study protocol was approved by the institutional review board of the University of Geneva Hospitals.

Inclusion and exclusion criteria were as follows: Biological mothers were included in the study if they had lived with their child for the majority of the child's life since birth. Due to physiologic measurements taken, women who were pregnant or breast-feeding were not accepted into the study. Children were included in the study if they were 12–42 months of age at the time of scheduled mother–child behavioral observations. Mothers were excluded if they were actively substance abusing or psychotic. Mothers and children were excluded from the study if they were physically and/or mentally impaired in such a way that would interfere with the ability to participate in laboratory tasks (i.e. cognitive, sensory, and motor impairments).

Sixty women and their children were recruited by flyers posted at the University of Geneva Hospitals and Faculties of Medicine and Psychology as well as at community centers, daycares, schools including domestic violence agencies and shelters. All comers were screened. Out of 60 who were screened and provided informed consent, 4 mothers were found to have a full-PTSD diagnosis or clinically significant symptoms (subthreshold) due to a non-IPV traumatic event (i.e. medical-surgical event, accident, natural disaster, etc.) and were thus excluded from the present analyses. Thirty-four mothers had PTSD symptoms, with the "A-Criterion" of the DSM-IV-TR related to IPV, among whom 24 met criteria for DSM-IV-TR diagnosis and 10 had clinically significant symptoms that were below the threshold for full-diagnosis. Thus, 56 French-speaking mothers (ages 18–45 years) and children participated (ages 12–42 months) including 34 mothers and children in the PTSD case-group and 22 mothers and children in the non-PTSD group. Fathers and other romantic partners of mothers were not seen in the study given concerns over safety and maintenance of trust for women who had experienced partner violence. Thus data about fathers were obtained by maternal report rather than from the fathers themselves.

Within 1 month after the screening visit, participants completed 2 videotaped visits over the ensuing 1–2 month period Fig. 1 shows the sequence of the screening, 1st and 2nd visits separated by 1–2 weeks. During the screening visit, following informed consent, mothers were given a socio-demographic and life-events interview followed by several self-report questionnaires. During the following visit, mothers were interviewed without their child present, with a focus on the mother's mental representations of her child and relationship with her child, an elaboration of her traumatic life-events, followed by structured diagnostic interviews and a series of dimensional measures. Then, 1–2 weeks later, mothers were asked to bring their child to the lab for a parent–child interaction procedure [25] followed by administration of measures focusing on the child's life events, psychopathology, and social-emotional development. Salivary samples were taken for measurement of cortisol and DNA extraction for analyses that are not discussed in this paper.

After each visit, mothers received 50 Swiss francs along with a small book or toy for their child.

Measures

Socio-Demographic Variables

During the screening session we conducted an interview with the mothers using the Geneva Socio-demographic Questionnaire (GSQ; [26]) which was adapted from the Structured Clinical Interview for the DSM-IV [27] and developed for the present study in order to obtain a detailed overview of the parents' socioeconomic status, characteristics and history of the mother-partner relationships, and exposure to stressful life-events (i.e. interpersonal violence, substance abuse, economic difficulties, immigration, and physical and mental health problems and interventions, and child protective and judicial services involvement). The family socio-economic status (SES) was calculated using the Largo Index [28], which is a well-validated SES index used in pediatric research in Switzerland that takes into account both parental educational attainment and occupational status.

IPV and Other Traumatic Life-Events

History of experience of traumatic events during childhood was assessed via the Brief Physical and Sexual Abuse Questionnaire (BPSAQ; [29]), and supplemented for other events during adulthood with the Traumatic Life Events Questionnaire (TLEQ). The TLEQ assesses 22 life events that could fulfill the "A-Criterion" for the DSM-IV diagnosis. The TLEQ shows stability and convergent validity across various studies and minority populations [30]. Twelve items that asked for the same events as the BPSAQ were eliminated from the TLEQ. Scoring of the BPSAQ was undertaken as described in a previous paper by the first

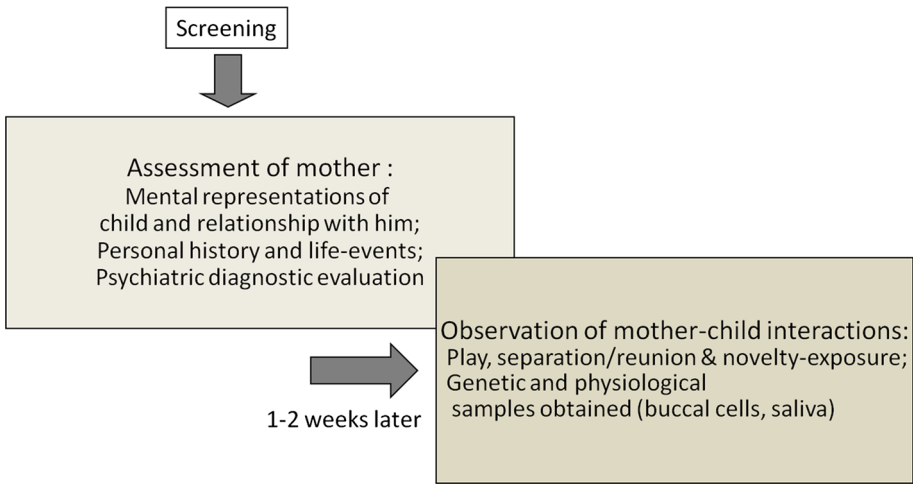

Fig. 1 Protocol design

author [10]. The severity of physical violence of the mother's partner and herself in the context of her adult romantic relationships was measured via the Conflicts Tactics Scale 2 Short Version (CTS2; [31]). This well-validated measure consists of 20 items that ask about tactics used by the subject's partner and herself in order to resolve relational conflict including physical aggression along a 7-point scale.

Maternal Psychopathology

During an initial videotaped interview IPV-exposed and non-IPV-exposed mothers underwent a variety of psychometrics including the Clinician administered PTSD scale (CAPS; [32]) to assess lifetime PTSD and the Post-traumatic Symptom Checklist -Short Version (PCL-S) additionally to assess current PTSD symptoms [33]. Subjects on both measures with no IPV and no PTSD symptoms were coded as having the minimum score of 16. Subjects with IPV exposure but with no PTSD symptoms were coded as having 17. For categorical analyses, mothers met criteria for violence-related PTSD if their A-criterion trauma was of a violent nature (i.e. due to child physical or sexual abuse or family violence exposure and/or adult physical or sexual assault), and if the CAPS score was at or above 55 and the PCL-S score was at or above 40 [34]. Subjects that were subthreshold for diagnosis yet with significant clinical symptoms such that they were included in the IPV-PTSD groups were those who had a CAPS score above 55 and a PCL-S score over 30 (rather than 40 as required for full-diagnosis).

Maternal depressive symptoms were also assessed. Mothers were evaluated via the Beck Depression Inventory–II (BDI-II; [35]) as a self-report measure for the current subjective symptom severity, as well as with the Structured Clinical Interview for the DSM-IV Mood Disorders Module (SCID; [27]), for lifetime and current diagnosis and number of symptoms as a marker of severity.

Parenting Stress

Parenting Stress was measured via the Parenting Stress Index-Short Form (PSI-SF; 36). This score includes items related to distress that parents feel in relation to their role as a parent and in light of other personal stressors, as well as parent–child relationship dysfunction, and child behavior that poses difficulty to parents. The PSI-SF has 36 items and each item is assessed on a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). It is a standardized instrument with a validated French translation. The PSI-SF shows high internal consistency (Cronbach's alpha .92) [36].

Alexithymia

Alexithymia was assessed using the well-validated French-language version of the Toronto Alexithymia Scale (TAS-20) which consists of 20 items [37]. The TAS-20 and its component subscales demonstrate good internal consistency (Cronbach's alpha .81) and test–retest reliability (.77). Its 3 component subscales are: Difficulty describing feelings; difficulty identifying feelings; externally-oriented thinking [38].

For this study, we used specifically the subscale "Difficulty Identifying Feelings" to test our a priori hypothesis that mothers with higher levels of difficulty in identifying their own and their child's feelings would have lower levels of maternal sensitivity (see "Introduction").

Maternal Behavior

Maternal sensitivity was measured via structured behavioral observations during 5 min of mother–child play. Two blind

Table 1 Sociodemographic characteristics and history

	Overall (n = 56)	Range	IPV-PTSD (n = 34)	Controls (n = 22)	Mann–Withney Z/Chi square [1]
Demographics					
Mothers age (in years)	34.0 (5.7)	22–47	33.1 (5.4)	35.3 (5.8)	−1.33
Child age (in months)	26.7 (8.8)	12–42	26.4 (9.1)	27.2 (8.6)	−.40
Child gender (% male)	51.7		55.6	45.4	.58
Socioeconomic status (low values = better status)	5.2	2–10	5.9 (2.2)	4.2 (2.0)	−2.59***
Mother separated or divorced from father	19.6 %		32.3 %	0 %	8.86**
Mother without partner in home	21.4 %		35.3 %	0 %	9.88***
Father's history					
Alcohol abuse	13.4 %		23.0 %	0 %	5.93*
Drug abuse	41.8 %		55.9 %	22.7 %	4.72*
Father violent towards others	34.5 %		65.7 %	0 %	24.2***
Mother's history					
Alcohol abuse	9.1 %		14.7 %	4.5 %	1.44
Drug abuse	25.5 %		35.3 %	13.6 %	3.20
Mother violent towards others	33.9 %		48.6 %	13.6 %	7.24**
Suicide attempts/injuring self	20.0 %		28.6 %	4.8 %	4.71*

(p) + ≤.1; * ≤.05; ** ≤.01; ** ≤.005

raters who were psychologists trained to reliability on the CARE-Index [39] coded the maternal and child behaviors. For the coding of maternal sensitivity, the coding procedure focused these raters' attention on seven aspects of maternal behavior some of which assess affect (facial expression, vocal expression, position and body contact, expression of affection) with other assessing "cognition", i.e., temporal order and interpersonal contingency (pacing of turns, control of the activity, and developmental appropriateness of the activity). Each aspect of behavior was evaluated separately. The scores were then summed to generate the maternal sensitivity scale score. This scale score has a range from 0 to 14, with zero sensitivity being dangerously insensitive, 7 being normally sensitive, and 14 being outstandingly sensitive. The CARE-Index also provides two additional scales: Controlling (i.e. intrusive) and Unresponsive (i.e. avoidant and withdrawing) maternal behavior that are coded using a similar scale-score to that of maternal sensitivity [40]. While our hypothesis did not concern these two additional scales, we have included them to help characterize maternal behavior associated with maternal IPV-PTSD [41]. Inter-rater reliability was excellent for all three scales (ICC = .86). The Infant and Toddler versions of the CARE-Index are well-validated [42, 43].

Data Analysis

Group comparisons (mothers with full diagnosis or sub-threshold IPV-PTSD vs. non-PTSD mothers) proceeded with Chi square tests for categorical variables and Mann–Whitney U tests for continuous variables (Tables 1, 2). Associations of continuous measures (e.g. maternal PTSD severity reported as the CAPS score, alexithymia and degree of maternal sensitivity) were analyzed using Pearson correlation coefficients (Table 3). Multiple linear regression models were then used to investigate maternal sensitivity (CARE-Index) as a function of various predictors (Table 4). All analyses were performed using SPSS versions 19 and 22 (IBM, Armonk NY, USA). Significance level was set at .05 (two-tailed tests).

Results

Among the 56 mothers whose data were analyzed and as shown in Table 1, maternal mean age was 34 years (SD 5.7), and while there were relatively older mothers in the control group, the difference between IPV-PTSD and non-PTSD groups was not significant ($p > .1$) Children's mean age was 27 months (SD 8.8) at the time of the parent–child interaction visit during which maternal sensitivity was measured, with no significant difference between IPV-PTSD and non-PTSD groups ($p > .8$). Nearly equal numbers of boys and girls participated in the study (29 boys; 27 girls); while there were relatively fewer boys in the control group, this group difference was not significant ($p > .3$). Group comparisons of additional socio-demographic variables are provided in Table 1. Of note, mothers with IPV-PTSD, had significantly lower socio-economic status (SES).

Table 2 Comparison of the IPV-PTSD group and the control group with respect to violence by most recent partner and by mother herself in the most recent relationship, PTSD (lifetime and current) and depression (current) symptom severities, overall Parenting Stress score on the PSI-SF and overall Alexithymia score and subscale scores on the TAS-20, as well as maternal sensitivity, controllingness and unresponsiveness (according to the CARE-Index)

	Overall (n = 56)	Range	IPV-PTSD (n = 34)	Controls (n = 22)	Mann–Withney Z
Violence by partner (CTS)	2.4 (6.3)	0–30	4.2 (7.8)	.05 (.21)	−3.08***
Violence by self (CTS)	.9 (2.9)	0–16	1.3 (3.6)	.2 (.7)	−2.32**
Lifetime PTSD (CAPS)	62.0 (36.3)	16–129	86.4 (19.7)	23.4 (16.6)	−6.09***
Current PTSD (PCL-S)	33.6 (15.4)	16–66	44.2 (9.4)	16.7 (1.2)	−6.36***
Current depression (BDI)	9.3 (8.0)	0–34	12.7 (8.7)	4.4 (3.1)	−3.94***
Parenting stress (PSI-SF)	40.5 (20.9)	12–122	46.7 (22.4)	32.3 (15.0)	−2.44***
Alexithymia (TAS-20 overall score)	44.8 (11.6)	22–75	47.4 (12.2)	40.55 (9.2)	−2.27*
Difficulty identifying feelings	15.0 (5.8)	7–27	16.80 (6.2)	11.9 (3.7)	−3.25**
Difficulty describing own feelings	12.9 (4.6)	5–23	13.4 (4.7)	12.05 (4.1)	−1.16
Outwardly oriented thoughts	16.8 (4.3)	8–25	17.1 (4.69)	16.5 (3.66)	−.33
CARE-index					
Maternal sensitivity	5.4 (1.3)	3–7	4.8 (1.3)	6.1 (1.1)	−3.26**
Maternal controllingness	2.8 (1.6)	0–7	3.2 (1.6)	2.3 (1.5)	−2.31*
Maternal unresponsiveness	2.7 (1.7)	0–6	3.0 (1.7)	2.2 (1.5)	−1.74+

(*p*) + ≤1; * ≤05; ** ≤.01; *** ≤.005

Table 3 Correlations between socioeconomic status, severity of adult IPV, maternal psychopathology, parenting stress, maternal difficulty in identifying feelings, and maternal sensitivity, controllingness, and unresponsiveness on the CARE-Index

Variable	1	2	3	4	5	6	7	8	9
1. SES	1	.29*	.26*	.14	.17	.34**	-.37**	.05	.39***
2. IPV		1	.30**	.28*	.12	.21	-.25	.09	.20
3. PTSD			1	.57***	.44***	.43***	-.51***	.42***	.22+
4. Depression				1	.62***	.22	-.28*	.09	.10
5. Parenting stress					1	.40***	-.25+	.16	.11
6. Difficulty identifying feelings						1	-.40***	.23*	.26+
7. Maternal sensitivity							1	-.61***	-.47***
8. Maternal controllingness								1	-.21
9. Maternal unresponsiveness									1

Maternal variables: *SES* socio-economic status, *IPV* Conflict Tactics Scale Partner Physical Aggression severity in most recent relationship; *PTSD* CAPS overall score; depression = BDI-II (current); parenting stress = overall PSI-SF score; difficulty identifying feelings = TAS-20 subscale score; maternal sensitivity, maternal controllingness, and maternal responsiveness = CARE-Index score based on observations of play

(*p*) + ≤.1; * ≤.05; ** ≤.01; *** ≤.005

Life events that are typically reported as "traumatic" by mothers were analyzed according to IPV-PTSD versus non-PTSD group-membership, and were significantly more common among IPV-PTSD mothers, yet frequently noted among non-IPV mothers at a higher prevalence than expected (see Fig. 2).

Mothers were also asked if their child's father had experienced family or other interpersonal violence during his own childhood with the understanding that these data would be based on maternal report and subject to error. According to mothers, as shown in Table 1, significantly more case-fathers than control-fathers experienced family or other interpersonal violence during their childhood up to age 16 (55.6 % of case-fathers as compared to 30 % of control-fathers, $p < .001$). The authors did not ask mothers to provide further trauma history data concerning their child's father. Fathers of children with IPV-PTSD mothers as compared to non-PTSD mothers were, in addition to being more violent, more likely to have been substance abusers.

IPV-PTSD mothers showed a higher comorbidity of adult experience of IPV with other forms of violent trauma

Table 4 Maternal sensitivity as a function of maternal PTSD symptom severity (CAPS), maternal ability to identify feelings in others (TAS-20) and socio-economic status (univariate and multiple linear regression models)

Predictors of maternal sensitivity	B	SE	β	*p*	R^2	Sig $R^2\Delta$
1. PTSD (univariate)	−.02	.004	−.51	<.001	.26	…
2. Difficulty identifying feelings (univariate)	−.09	.03	−.40	.002	.16	…
3. SES (univariate)	−.22	.07	−.37	.005	.14	…
4. Difficulty identifying feelings	−.16	.03	−.29	.036	.21	versus 1:.036
SES	−.06	.08	−.28	.041		versus 2:.041
5. Difficulty identifying feelings	−.05	.03	−.22	.097	.31	versus 1:.097
PTSD	−.015	.005	−.43	.002		versus 2:.002
6. PTSD	−.015	.004	−.44	.001	.32	versus 1:.036
SES	−.15	.069	−.25	.036		versus 3:.001
7. Difficulty identifying feelings	−.03	.03	−.13	.333	.34	versus 4:.003
PTSD	−.01	.005	−.40	.003		versus 5:073
SES	−.13	.07	−.23	.073		versus 6:.333

and maltreatment throughout childhood and adulthood when compared to controls (see Fig. 3). Roughly half of the non-PTSD control group experienced one or more forms of interpersonal violence throughout their lifetime.

Table 2 shows group comparisons of severity of adult IPV in the current or most recent relationship with an intimate, maternal psychopathology, parenting stress, alexithymia, and maternal sensitivity.

Table 3 shows correlations of continuous measures of socioeconomic status, severity of adult IPV, maternal psychopathology, parenting stress, maternal difficulty in identifying feelings, and maternal sensitivity, controllingness, and unresponsiveness on the CARE-Index. In keeping with our first hypothesis, global severity of posttraumatic stress was significantly associated with mothers' difficulty in correctly identifying others' feelings. We had further hypothesized that maternal difficulty in identifying feelings would be most closely correlated with the severity of symptoms in the avoidance cluster of PTSD, as opposed to the re-experiencing and hyperarousal clusters. Difficulty identifying feelings was in fact most strongly correlated to CAPS hyperarousal and dissociative symptom severity, yet significantly associated with all PTSD symptom clusters: re-experiencing $r = .34$ ($p = .01$); avoidance $r = .36$ ($p = .006$); hyperarousal $r = .47$ ($p < .001$); dissociative symptoms $r = .49$ ($p = .009$). In agreement with our second hypothesis, maternal difficulty in correctly identifying others' feelings was negatively associated with maternal sensitivity.

Table 4 shows multiple linear regression models that tested the third hypothesis that maternal IPV- PTSD symptom severity and difficulty identifying feelings were additive predictors of decreased maternal sensitivity, after taking into account SES as a potential confounder. PTSD symptom severity and difficulty identifying feelings were each significantly associated with decreased maternal sensitivity when entered into the model after adjusting for

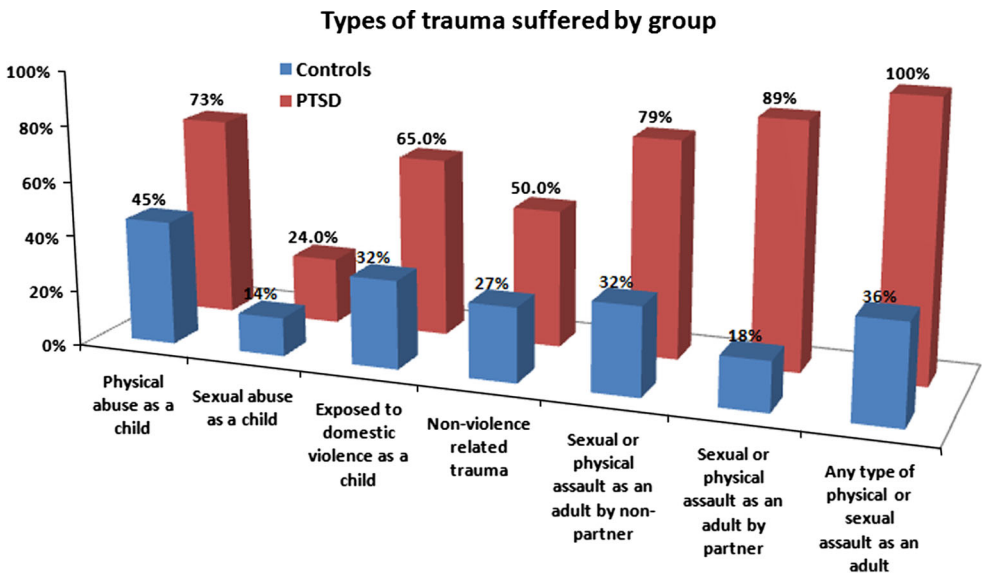

Fig. 2 All mothers with PTSD that were included had experienced interpersonal violence as adults, and a majority as children as well. Many of the non-PTSD controls also experienced interpersonal violence as children or adults

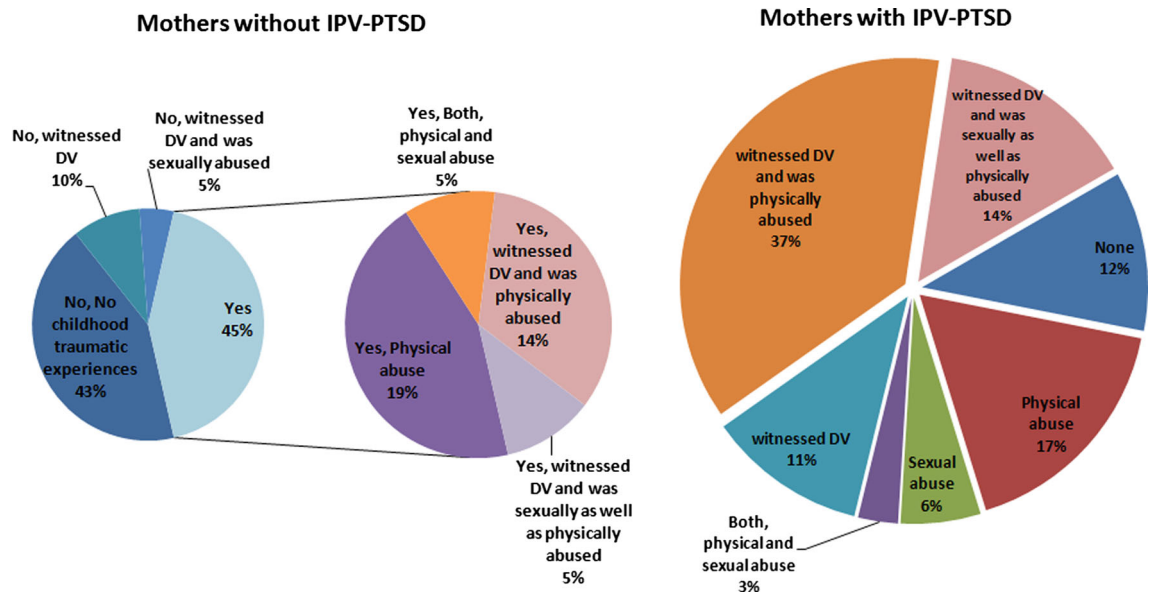

Fig. 3 Mothers with IPV-PTSD were more likely than controls to have experienced two or more forms of violence; whereas, non-PTSD controls were more likely to have experienced only a single form of violence if they had reported experiencing violence at all

SES. Taken together, the three variables accounted for 34 % of the variance of maternal sensitivity. PTSD symptom severity, however, remained significantly associated with decreased maternal sensitivity in the full model, in contrast with maternal difficulty in identifying feelings and SES. The *F* test applied to test the significance of change in R-square confirmed that maternal difficulty in identifying feelings fell short of contributing significantly to the model (sig = .097). Although not displayed in Table 4, current maternal depressive symptom severity as measured on the BDI-II was added into a regression model with PTSD severity to predict maternal sensitivity. Maternal depressive symptom severity was neither significant ($p > .8$) nor additive to the model. As seen in Table 3, the three aforementioned predictors as well as maternal depressive symptom severity were significantly correlated with each other, but collinearity diagnostics did not reveal any major estimation problem (all variance inflation factors <2).

Discussion

This study confirms a robust association between maternal difficulty in correctly identifying others' feelings, as measured by the subscale of the Toronto Alexithymia Scale-20 (TAS-20) of the same name and the severity of IPV-PTSD, as these two variables are negatively associated with maternal sensitivity on the CARE-Index. This TAS-20 subscale was positively correlated with IPV-PTSD symptoms in all symptom clusters, yet also robustly, with the dissociative symptom subscale of the Clinician Administered PTSD Scale (CAPS). The latter is consistent with the literature hypothesizing a relationship to emotional numbing among PTSD patients [17]. Maternal difficulty in identifying feelings had no significant relationship with IPV severity alone. The fact that IPV-PTSD but not IPV severity alone was associated with this TAS-20 subscale is consistent with the literature which suggests that this subscale is linked to the individual's psychobiological response to violence exposure and not to the experience of violence itself.

Several studies have pointed to the direct impact of violence-exposure on maternal mental representations, maternal sensitivity, and attachment security-linked variables without apparently having evaluated the subjects for PTSD and other forms of trauma-associated psychopathology [44, 45]. The present findings lend support to the notion that violent events which mothers in this study experienced were not in and of themselves predictive of effects on their behavior as how their minds processed those events. PTSD is thus akin to a lens that colors and shapes the violence that mothers experienced [12, 41, 46]. And it is a specific lens that overrode the effects of maternal depressive symptom severity at the time of the observed mother–child interaction.

Findings supported the hypothesis that greater maternal difficulty in correctly identifying others' feelings was robustly and negatively associated with less maternal sensitivity. Yet this relationship paled when maternal PTSD severity was entered with it in a multiple linear regression model. One recent study showed that alexithymia as

measured by the instrument used in this study (TAS-20) reflected a psychopathology-related state and avoidance of negative affects rather than an intrinsic or trait-related form of alexithymia [47].

Mothers, in any case, who have difficulty in correctly reading their toddlers' emotions or who exert avoidance or dissociation of negative feelings associated with traumatic memories of violence have been shown to have more hostile, intrusive behavior towards their young children [48, 49]. In the present study, IPV-PTSD mothers as compared to non-PTSD mothers were indeed found to be more stressed as parents, more likely to become violent themselves, and more likely to harm themselves. Moreover, IPV-PTSD mothers displayed more controlling and unresponsive behavior on the CARE-Index than non-PTSD mothers. In terms of these findings pertinence to intergenerational transmission of trauma and violence, one study has shown that children of mothers with alexithymic difficulties, particularly male children, have been shown to develop aggressive behaviors [50].

We hypothesized that maternal difficulty identifying feelings in self and other would have an independent adverse effect on maternal sensitivity that would be additive to that of PTSD. Results did not support this hypothesis: when added to a model taking into account IPV-PTSD symptom severity and SES, the contribution of maternal difficulty identifying feelings was not significant, with only a minor increase of the fraction of explained variance (from 32 to 34 %).

These results thus support that alexithymia in our sample is PTSD- and predominantly state- rather than trait-related [47]. An alternative hypothesis based on the developmental psychology literature would be that maternal difficulties in reading, marking and responding contingently to the emotional communication of their young children might also be associated with a disturbance of attachment [51]. Child emotional abuse and neglect by the parent(s) within the context of a disturbed attachment, for example, have been associated with more severe alexithymia [52]. Indeed, many participant mothers who experienced interpersonal violence during adulthood had histories of childhood violence and maltreatment exposure that often, in turn, reflected most probably a disturbance of their primary attachment [53].

Trauma and attachment are therefore both independent yet overlapping variables to be considered in the context of early development and of the study of families with complex trauma histories across generations [54, 55]. Maternal sensitivity, a strong predictor of attachment security, was negatively associated with maternal difficulty in identifying feelings and maternal IPV-PTSD severity.

Similarly, maternal controlling and unresponsive behavior were also both associated with maternal IPV-PTSD, but less with maternal alexithymia. Previous studies have found a relationship between the nature of maternal trauma involving physical violence and controlling, hostile, and intrusive caregiving [12, 41]. Unresponsive, withdrawing, and anxious-avoidant behavior was associated with higher levels of posttraumatic avoidance and dissociation [41, 56]. Both behaviors, while very different, have been associated with increased oppositionality, dysregulated-aggressive and anxious behaviors among children [57, 58].

Maternal controlling behavior has been associated with child compulsive compliance and oppositionality [59]; and maternal unresponsive behavior has been associated with difficulty in maternal limit-setting, with subsequent fearful and aggressive behaviors [41]. Of additional interest, the relationships of these two atypical maternal behaviors was significant to maternal PTSD but not to depression. This likely points to the specific effects of maternal IPV-PTSD [60].

Limitations

One limitation of this study is that it was not possible given the cross-sectional rather than longitudinal nature of this study to understand the extent to which SES is a risk factor for maternal violence-exposure, PTSD, and alexithymia versus an effect of maladaptation resulting from chronic psychopathology [61, 62]. This study focused rather on the testing of a priori hypotheses that related the effects of maternal IPV-PTSD together with alexithymia on maternal behavior. Thus, the "chicken or egg" question of SES remained beyond the scope of this paper.

Another possible limitation was the use of the self-report version of the TAS-20 to measure alexithymia. Several articles have suggested that the validity of the TAS-20 subscale involving outwardly oriented thoughts has shown inadequate validity and reliability, therefore putting into question the overall score [63]. Yet, the subscale that we used to test our a priori hypotheses in the present study—namely, difficulties identifying feelings, showed excellent reliability in the same study. Given the complex prospect of asking someone who has difficulty in identifying and labeling emotions in self and other to complete a self-report questionnaire and to identify and label these difficulties has been cited as a drawback to the TAS-20 [64]. Thus the Toronto Structured Interview for Alexithymia (TSIA) has been used with increasing frequency and would be beneficial to subsequent study in this area [64, 65]. Another possible limitation is that we measured maternal sensitivity only during play that preceded the separation-reunion laboratory stressor. A next step would be to compare interactions prior to laboratory stressors, such as during free-play, with interactions following separation/novelty-exposure [56]. Future studies might also better define

specific difficulties and confusion in identifying feelings in self and others via more precise, active social, cognitive and affective neuroscience-informed tasks, and to include more extensive data drawing directly from fathers.

Summary

This study tested the hypothesis that maternal difficulty in identifying emotions in self and other, as an important dimension of the construct of alexithymia, together with maternal IPV-PTSD, would increase the risk for disturbances in caregiving behavior that impact mutual emotion regulation within the mother–child relationship beyond the effect of either variable alone. Following maternal diagnostic interviews and administration of the Toronto Alexithymia Scale, 56 mothers and toddlers (ages 12–42 months) were filmed during free-play and separation/novelty-exposure. Observed maternal sensitivity was coded via the CARE-Index. Maternal IPV-PTSD severity, difficulty in identifying emotions, and lower socio-economic status (SES) were associated with less maternal sensitivity, and together accounted for more than one-third of the variance with respect to this dependent variable. Maternal IPV-PTSD severity, difficulty in identifying emotions, and lower socio-economic status (SES) were also associated with greater maternal controlling and unresponsive behavior as consistent with previous findings [12, 41, 56, 57]. The findings of the present study suggest that clinical intervention with mothers who have IPV-PTSD and their very young children would best focus both on identifying, tolerating, and contextualizing IPV-associated emotions and memory traces in their children and themselves with the aid of an experienced clinician who models and supports mentalization [13, 24].

Acknowledgments This research was supported by the National Center of Competence in Research (NCCR) "SYNAPSY. The Synaptic Bases of Mental Diseases" financed by the Swiss National Science Foundation (No. 51AU40_125759), the Gertrude von Meissner Foundation, and la Fondation Prim'Enfance.

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