Reflective functioning, maternal attachment, mind-mindedness and emotional availability in adolescent and adult mothers at infant three months

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Abstract

The study evaluated reflective functioning, maternal attachment, mind-mindedness and emotional availability among 44 adolescent mother-infant dyads and 41 adult mother-infant dyads. At infant age 3 months, mother-infant interaction was coded with the mind-mindedness coding system and Emotional Availability Scales; mother attachment and reflective functioning were evaluated with the Adult Attachment Interview. Adolescent mothers (vs. adult mothers) were more insecure and had lower reflective functioning; they were also less sensitive, more intrusive and hostile and less structuring of their infant's activity; they used fewer attuned mind-related comments and fewer mind-related comments appropriate to infant development. In adult mothers the Mother Idealizing and Lack of Memory AAI scales were correlated to non-attuned mind-related comments and the Father Anger scale to negative mind-related comments. In adult mothers reflective functioning was associated to sensitivity. This was not the case with adolescent mothers. In both groups of mothers there were no associations between sensitivity and mind-mindedness.

Keywords: adolescent and adult mother, adult reflective functioning, mind-mindedness, emotional availability, maternal attachment

Introduction

Reflective functioning (RF) has been defined (Fonagy, Gergely, Jurist, & Target, 2002) as the capacity to consider close relationships and the self in terms of mental states, understanding one's own behavior and that of others in the light of these states, such as feelings, thoughts, desires, intentions, motivation or beliefs. It has been conceived as the operationalization of the construct of mentalization, a multidimensional construct which has been specifically developed in the context of attachment theory (Fonagy & Allison, 2012). In that area the capacity for mentalization involves both cognitive and meta cognitive processes, such as thinking of oneself and others as possessing a mind, assuming an intentional stance (Dennett, 1987), and emotional processes relative to the capacity to reflect on affective states, facilitating their regulation (Fonagy et al., 2002). It also involves self-reflection and interpersonal components. According to Attachment Theory the processes of mentalization are products of a development process based on attachment relations which can mirror the subjective states of the infant in particular emotional states, becoming a source

of trust (Fonagy & Allison, 2014), and thus fostering the representation of oneself and the other as the subject of mental states.

Adult and parental RF and sensitivity

Assessment of RF as the operationalization of the capacity of mentalization was developed by Fonagy and Steele through construction of the *Reflective Functioning Scale* (Fonagy, Target, Steele, & Steele, 1998), to be applied to the analysis of transcripts gathered through the *Adult Attachment Interview* (Main & Goldwin, 1994-1998). The scale assesses a subject's awareness of the nature of mental states, awareness of the presence of mental states underlying behavior and recognition of the developmental aspects of mental states. From this perspective, RF, albeit considered within the context of an interview aimed at exploring mental states as regards attachment, is a more general aspect of mental functioning. Since the first studies in this area, the construct of RF has been used to study aspects of the parent/child relationship with regard to attachment. Research has shown that high parental RF is predictive of a child's secure attachment (Fonagy, Steele, Steele, Moran, & Higgitt, 1991), and that in parents with adverse experiences (Fonagy, Steele, Steele, Higgitt, & Target, 1994) it increased the probability of children having secure attachment. RF has also been shown to be correlated to maternal attachment measured with the AAI (Fonagy et al., 1998), just as it has been shown to have a high correlation with the coherence scale of the AAI (Jessee, Mangelsdorf, Wong, Schoppe-Sullivan, & Brown, 2016; Main, Goldwyn, & Hesse, 2002).

A more restricted meaning of RF has also been conceived concerning representation by the parent of the infant and of his/her relationship with the infant explored in the present. In this regard see Slade's (Slade, Aber, Bresgi, Berger, & Kaplan, 2004) Parent Development Interview (PDI) and Zeanah's (Zeanah, Benoit, & Barton, 1995) Working Model of the Child Interview (WMCI). The transcripts of both interviews may be coded to assess RF by means of the same scale (Fonagy et al., 1998) as that used to analyze the AAI with an ad hoc addendum by Slade to analyze her PDI interview (Slade et al., 2004).

It is therefore useful (Katznelson, 2014; Sharp & Fonagy, 2008) to distinguish between adult RF, which focuses on the capacity of the adult to reflect on his/her past attachment experiences, also considered however in the present (assessed by means of AAI), and parental RF, which focuses on the capacity of the parent to reflect in the present on the infant and on his/her relationship with him (measured with the parenting interviews). In this regard we may point out that assessment of RF by AAI allows investigation of a broad dimension of mentalization processes relative to relationships since it considers the attachment experiences of the subject both in the past and at the time of the interview, also exploring the parent's idea of the future prospects of the child, if there is a child, or

of a hypothetical child. Interviews such as PDI and WMCI focus mainly on the representation which the parent has of the infant and of his/her relationship with the infant. Therefore, they involve an analysis of the processes of mentalization which is focused more restrictively on this relationship.[1] A number of studies have, in this regard, examined the relationship between parental RF, measured by the PDI, and parental sensitivity. According to these studies parental RF is correlated with disruptive affective communication of the parent (Slade, 2005), and maternal sensitivity (Rosenblum, McDonough, Sameroff, & Muzik, 2008; Suchman, DeCoste, Leigh, & Borelli, 2010).

To our knowledge, however, no study has examined a possible connection between adult RF and parental sensitivity, although numerous studies have examined the relationship between maternal state of mind about attachment and parenting capacity assessed both as sensitivity (Pederson, Gleason, Moran, & Bento, 1998), synchronization capacity (Feldman, 2003), affective coordination (Riva Crugnola et al., 2013) and emotional availability (Biringen et al. 2000). It would be particularly interesting, therefore, to examine the association between maternal mentalization, considered more broadly in relation to the mother's past and present attachment relationships and not only in relation to representation of the infant and the sensitivity shown towards him in early infancy. One aim of our study, therefore, is to address this gap in the literature on the relationship between adult RF and sensitivity.

Reflective functioning, attachment, mind-mindedness and sensitivity

A concept which is connected to the construct of reflective functioning is that of *mind-mindedness* (Meins, 1997). This concept is a "bridge" between mentalization and parental sensitivity, positioned, as Meins states (2013a, p. 408) "at the interface between representational and behavioral operationalization of caregiver-child interaction". Mind-mindedness is defined by Meins as the capacity of the parent to "conceive of the infant as having a mind", attributing putative mental states to his behavior (Meins, 1997, 2013b). The singularity of this construct informs the resulting methods of assessment. In infant/caregiver interaction, mind-mindedness is mainly measured by coding the verbal comments which the caregiver makes to the infant in interacting with him. The evaluation of mind-mindedness thus allows the caregiver's capacity for mentalization with regard to the infant to be assessed "on-line". At the same time the caregiver's attunement with the infant can be measured by the appropriateness of such comments in effectively identifying the emotions and intentions underlying the behavior and communication of the infant (Meins, 2013a).

[1] Hereunder we shall use adult RF to designate reflective functioning assessed with AAI and parental RF to designate reflective functioning assessed with interviews on parenthood such as PDI and WMCI.

"Mind-related" comments are divided into appropriate and non-attuned comments, the second being conceived as demonstrating that the parent cannot appropriately identify the mental states of the infant in relation to its behavior, actually "misinterpreting them" (Meins et al., 2012).

To our knowledge only the Arnott and Meins study (2007) has examined the relationship between mind-mindedness and adult RF by also analyzing the quality of parental attachment. The study showed a significant association in mothers between high RF and fewer non-attuned mind-related comments, but not between the quality of maternal attachment and indicators of mind-mindedness. The study, however, involved only a small sample and, for what concerns the relationship between adult RF and mind-mindedness, has not been replicated. A subsequent study (Milligan, Khoury, Benoit, & Atkinson, 2015) explored the link between maternal attachment and mind-mindedness, obtaining counter-intuitive results according to which coherence of the mind with regard to attachment was negatively correlated with mind-mindedness.

One study, however, has examined the connection between parental RF and mind-mindedness, (Rosenblum et al., 2008) showing that they are correlated and predict maternal sensitivity and highlighting how parental RF is a better predictor of sensitivity than mind-mindedness.

According to some studies mind-mindedness is also associated with maternal sensitivity (Meins, Fernyhough, Fradley, & Tuckey, 2001; Demers, Bernier, Tarabulsy, & Provost, 2010; Farrow, & Blissett, 2014). However, other studies have not shown that this relationship is significant, either in non-at-risk samples (Camberis, McMahon, Gibson, & Boivin, 2015) or in at-risk samples constituted by adolescent mothers (Demers et al., 2010).

To sum up, very few studies have examined the relationship between adult RF and other representational variables – state of mind about attachment, mind-mindedness – and interactional variables – sensitivity, emotional availability – which pertain to maternal parenting.

As we said above, our hypothesis is that RF measured with AAI is related to a broader capacity for mentalization than RF assessed by interviews on parenthood, the latter being considered more dependent on the specific relationship with the infant. Therefore analyzing in a community sample links between adult RF, mind-mindedness and sensitivity while examining attachment is of particular interest. Indeed, the results could help to clarify whether the sensitivity of the mother towards the infant and her capacity for mind-mindedness are correlated only with a "restricted" definition of RF constituted by parental RF, as a number of the studies examined above have shown, or whether they are also correlated to the broader definition which pertains to adult RF evaluated by AAI.

Reflective functioning, attachment, mind-mindedness and sensitivity in adolescent mothers

It is important to note that the relationship between RF, maternal attachment, mind-mindedness and sensitivity has only been examined by a few studies concerning parenting at-risk samples. In this regard, no study has examined the relationship between adult RF and sensitivity in at-risk samples. A few studies have examined the relationship between parental RF and maternal sensitivity in at-risk samples, coming up with mixed results. The study conducted with mothers with experiences of childhood abuse (Stacks et al., 2014) has found an association between the two variables, while those conducted with mothers with substance abuse (Pajulo et al., 2012) and mothers who had PTSD (Schechter et al., 2008) have not found this association. Furthermore, no study has examined in at-risk samples the relationship between parental RF or adult RF and mind-mindedness.

An at-risk group of particular interest is that of adolescent mothers. Young mothers have been shown to have a low capacity for mentalization at the level of both adult RF (Riva Crugnola, Ierardi, Gazzotti, & Albizzati, 2014) and parental RF (Sadler et al., 2013; Sadler, Novick, Meadows-Oliver, 2016) and for mind-mindedness (Demers et al., 2010).

For what concerns sensitivity, adolescent mothers have also been shown to employ more intrusive or detached styles with their infants (Berlin, Brady-Smith, & Brooks-Gunn, 2002), being less competent in the expression (Pomerleau, Scuccimarri, & Malcuit, 2003) and regulation of emotions (Riva Crugnola et al., 2014). For what concerns emotional availability measured with the EA scales (Biringen, 2008) adolescent mothers have been shown to be less sensitive and structuring and to be more intrusive and hostile than either young mothers (Easterbrooks, Chauhuri, & Gestsdottir, 2005) or adult mothers (Ierardi, Gazzotti, Albizzati, & Riva Crugnola, in press).

Given the high level of risk identified in adolescent mothers with respect to caring for their infants (Krpan, Coombs, Zinga, Steiner, & Fleming, 2005), it would be first of particular interest to examine the difference between a sample of adolescent mothers and a community sample of adult mothers in relation to their sensitivity and emotional availability towards their infants and their capacity for mentalization and mind-mindedness. No study has compared the adolescent mother at-risk sample with the community sample of adult mothers, examining both their capacity for mentalization, analyzing RF and mind-mindedness, and their parenting skills from a behavioral perspective, assessing sensitivity and interaction styles. What would also be particularly interesting to assess - given the paucity of studies in this regard for both groups – is the relationship between the variables examined, especially regarding the relationship between representational and interactional aspects, in the group of adolescent mothers as well as in the group of adult mothers.

Approach of our study

There are therefore two aims to our study. The principal aim is to compare adult RF, attachment, mind-mindedness and emotional availability, which includes, in addition to sensitivity, other dimensions related to sensitivity such as structuring, non-intrusiveness and non-hostility (Biringen, 2008), in adult mothers and adolescent mothers at infant 3 months. We will consider mind-mindedness as regards appropriate and non-attuned comments, the quality of expressed emotions (positive, negative and neutral) and development-appropriate comments.

The hypotheses we make in this regard on the basis of the studies examined and on what has been considered thus far are as follows: 1) that adolescent mothers will have a lower average RF score and a greater frequency of insecure attachment models than adult mothers; 2) that adolescent mothers, compared to adult mothers, will make fewer appropriate mind-related comments, more mind-related non-attuned comments with a less positive and more negative valence, and fewer development-appropriate comments; 3) that adolescent mothers will, on the whole, display less emotional availability - considered in the various components provided by the EA, such as sensitivity, the capacity for structuring, non-hostility and non-intrusiveness - than adult mothers.

The second aim of the study is exploratory, given the paucity of prior research and also the small number of participants in the groups. We propose to assess the relationship between adult RF, attachment, mind-mindedness and emotional availability of the mother at infant three months in both adult and adolescent mother groups. Since studies relating to adult mothers have mainly examined the relationship between parental RF and not adult RF and the other variables of our study, our analysis with respect to this relationship is exploratory. Given the paucity of studies on adolescent mothers in this regard, examination of the relationship between RF, maternal attachment, mind-mindedness and emotional availability is also exploratory.

The study was conducted at infant 3 months, a period that has been little investigated in previous studies, but which is considered to be of particular importance for the structuring of interactive patterns and of emotional regulation between infant and caregiver, seen as crucial for the formation of future attachment models (Beebe et al., 2010). Indeed, all previous studies have examined RF, mind-mindedness and maternal sensitivity starting from infant six months. We believe it is important to extend the investigation into RF, mind-mindedness and emotional availability to infant 3 months in order to examine, in the first stage of the formation of the mother/infant relationship, the association between mind-mindedness and sensitivity and to explore the possible adult RF, maternal attachment, mind-mindedness and sensitivity connection measured by EAS.

Method

Participants

The study is part of a broader research project on maternity in adolescence. The first aim of the research project is to compare adolescent mother/infant dyads and adult mother/infant dyads in the first months of the infants' lives with respect to a set of representational and interactional variables such as: maternal attachment and RF, interaction styles, emotional availability and mother/infant emotion regulation, mind-mindedness, infant attachment (Riva Crugnola et al., 2014). The second aim is to assess the effectiveness of an attachment-based intervention model for adolescent mothers and their infants from infant age 3 months (baseline) to two years (Riva Crugnola, Ierardi, Albizzati, Downing, 2016; Riva Crugnola, Ierardi, Albizzati, & Downing, in press).
85 mother-infant dyads (72% of those recruited) took part in our study at infant 3 months. The mothers were informed that they would be participating in a study on the parent-infant relationship. 44 were adolescent mother-infant dyads with mothers aged between 15 and 21. For what concerns the adolescent mothers, we chose this age range in accordance with other studies which show that this is an at-risk period in the development of the mother-infant relationship. See the research of Easterbrooks (Easterbrooks et al., 2005; Easterbrooks, Chaudhuri, Bartlett, & Copeman, 2011) which used EA scales in a sample of young mothers aged under 21. It is also important to consider that in the Italian socio-cultural context the stage of adolescence lasts longer than it does in other countries, with adolescents living with their families of origin until a later age. 41 were dyads with adult mothers aged between 25 and 40.

The inclusion criteria for both groups: mothers could not have any mental or physical illness; infants had to be born full term without organic pathologies. The adolescent mothers had an average of 9.63 years of education with a range of between 8 and 13 years. The adult mothers had an average of 14.78 years of education with a range of between 8 and 18 years. SES was calculated with a modified Italian version of the *Index of Social Position* (Hollingshead, 1975; Rossi, 1994) which considers level of education and occupation.

The socio-demographics characteristics are described in Table 1.

[Insert Table 1]

The infants were the first children for all the mothers in the adolescent mother group and for 88% of the mothers in the adult mother group. All the mothers were European Caucasian.

The group of adolescent mother-infant dyads was recruited from the "Servizio di *Accompagnamento alla genitorialità in adolescenza*" [Accompanying Parenting in Adolescence Service] for young mothers at the ASST Santi Paolo and Carlo Hospital of Milan. The group of adult mother-infant dyads was recruited from the "*Accompagnamento alla crescita*" [Accompanying Your Baby's Growth] Service at the ASST Santi Paolo and Carlo Hospital of Milan.

The study protocol was approved by the institutional review board of the ASST Santi Paolo and Carlo Hospital of Milan. All subjects gave written informed consent.

Procedure

At infant three months the Adult Attachment Interview (George, Kaplan, & Main, 1985) was administered to the mothers to assess attachment models and RF and data was collected on their pregnancy, employment and educational status.

At infant 3 months (infant mean age = 3.41; SD = .30) mother-infant couples were video-recorded in a laboratory. The laboratory was a suitably furnished play room containing a small mattress on which the mother and infant could sit or lie and a number of toys appropriate for the age of the baby. The camera was positioned inside the room in front of the dyad. The video camera framed the mother and infant, who were sitting on a cushion, sideways. In this way the behavior of both members of the dyad and the expressions on their faces were visible and could be coded. The mothers were instructed to interact with the infant as they would normally do at home. The only restriction on the mother's behavior was that she should not lean forward and obstruct the camera's view of the child. The video-recordings lasted around 5 minutes and during this time the mother-infant pair was left alone in the laboratory room.

Measures

Adult Attachment Interview (AAI). The AAI is a semi-structured interview which explores the interviewees' relations with their parents as children, including early separation and means of comfort-seeking. According to the Main coding system (Main et al. 2002), based on 9-point scales, each interview was assessed for the following categories: Secure/Autonomous (F), Dismissing (Ds), Preoccupied (E), Unresolved/Disorganized (U). The interviews assigned to the U category received a secondary score of secure/autonomous, dismissing or preoccupied. Category classification on the AAI is based on continuous nine point scales ranging from (1) low to (9) high (Main et al., 2002).

Following the suggestion of Bakermans-Kranenburg and van IJzendoorn (2009) and the studies of other researchers (Riva Crugnola et al., 2013; Roisman, Fraley, & Belsky, 2007; Whipple, Bernier, & Mageau, 2011) in the analysis we also used, in addition to the categorical system, the dimensional system based on the continuous scale ratings of the AAI. The advantage of using the AAI scales is that the association between the state of mind AAI scales and the other variables measured at dimensional level of our study, such as RF scale, mind-mindedness comments and emotional availability scales, can be assessed

The AAI scales are grouped by inferred experiences, which concern the probable nurturing experiences of the interviewee during childhood with respect to attachment relationships and the scales relating to state of mind with regard to attachment figures. Other scales concern overall states of mind with regard to attachment. In our study we used all the scales relating to state of mind with regard to attachment figures and all the scales relating to overall state of mind with regard to attachment. In particular we used the scales of Coherence of Transcript and of Coherence of Mind which are associated with the Secure Autonomous category; the Idealizing Mother and Father scales that together with the Insistence on Lack of Recall scale appear to be associated with the Dismissing category; the scales Involving Anger toward Mother and Father that together with the Passivity scale are associated with the Preoccupied category; and the Unresolved Loss and Trauma scales that are associated with the Unresolved/Disorganized classification (Hesse, 2008).

For the scales Coherence of Transcript and Coherence of Mind, scales, we selected the Coherence of Mind scale because the intercorrelations of the two scales were very high. In the data analysis we dropped the scales of Mother and Father Derogation, Overall Derogation of Attachment, Metacognitive Monitoring, and Fear of Loss due to low occurrence (all Ms< 1.30 on a 1–9 scale). The interviews were scored by two independent judges reliable to the coding system and concordance between the two coders for the four way classifications was k =.76 and for the two way classifications (secure versus insecure) k = 1.00. The two raters were blind to maternal level of education and socio-economic status.

Reflective Functioning Scales. The reflective functioning scale (*Reflective Functioning*, *RF*; Fonagy et al., 1998) applied to the Adult Attachment Interview allows assessment of the mentalization of the interviewee, understood as the capacity to give meaning to one's own and others' experiences in terms of mental states and emotions. Reflective functioning is measured by means of a scale from -1 to 9. The category *Negative RF (-1)* covers interviewees who are confused or hostile and refuse all attempts on the part of the interviewer to get them to begin any reflection; the category *Lacking in RF (1)* covers interviewees in whom reflective functioning is totally or almost totally absent. They may mention mental states occasionally with respect to themselves or others, but such mentioning is not connected to feelings underlying the behavior of the interviewee; the category *Questionable or Low RF (3)* covers interviewees who display some evidence of awareness of mental states, albeit at a fairly rudimentary level. The category *Ordinary RF (5)* covers interviewees who possess some type of model of the mind of attachment figures and of their own mind which is relatively consistent if simple; the category *Marked RF (7)* covers interviewees who demonstrate awareness of the nature of mental states for the entire interview and express efforts to reflect on the mental

states underlying behavior; the category *Exceptional RF (9)* covers interviewees who are exceptionally sophisticated and surprising, adopting causal reasoning in which mental states are used.

Reliability between coders was calculated on 20% of the interviews through the intraclass correlation coefficient and was ICC = .82. Both coders (the first and second authors) were trained and reliable for the RF scales.

Mind-Mindedness. Maternal mind-mindedness was assessed from a video-taped 5-min free-play session, using the procedures outlined by Pawlby and colleagues (2010). Mothers' speech during the sessions was transcribed verbatim; the comments were divided into: comments not referring to the infant's mind or emotion (Not Mind-Related) and comments that included an internal-state term referring to the infant's mind or emotion (Mind-Related comments). Mind-related comments included references to wishes and desires, mental states, mental processes, emotions, attempts to manipulate people's beliefs and comments where the mother ''put words into her infant's mouth''. A mind-related comment was also classified as an appropriate mind-related comment if one or more of the following conditions were met: (a) the independent coder agreed with the mother's reading of her infant's internal state, (b) the internal state comment linked the infant's current activity with similar events in the past or future, (c) the internal state comment served to clarify how to proceed if there was a lull in the interaction, or (d) the mother voiced (using the first person) what the infant might say if he⁄she could speak (Meins & Fernyhough, 2010). In addition, following Demers and colleagues (2010), we coded the valence of the mental descriptors, with each descriptor classified as positive, neutral, or negative. Words such as "strong-willed" or "headstrong" were characterized as negative mental descriptors if the context indicated the parent experienced this characteristic as oppositional. Attributes such as "knows her own mind" were classified as neutral, and those such as "great sense of humour" and "caring" were classified as positive. Given the presence in the study of the group of adolescent mothers, who were less aware of the stages of development of the infant than the adult mothers (Ryan-Krause, Meadows-Oliver, Sadler, &Swartz, 2009), the mother's comments were also classified as appropriate or inappropriate for the infant's developmental level (Meins & Fernyhough, 2010).

The mind-mindedness score was the number of mental descriptors expressed as a proportion of the total number of descriptors used in order to control for differences in maternal verbosity. Higher proportional scores indicated greater mind-mindedness. To assess for inter-rater reliability, a random selection of transcripts (20%) were scored by two raters blind to mothers' reflective functioning and emotional availability data. Inter-rater reliability were K = .89 for mind-related

comments, K = .92 for appropriate mind-related, and K = .77 for the emotional valence of comments.

Emotional Availability Scales. The EAS (Biringen, 2008) is a global measure of caregiver–child relational quality focusing specifically on the emotional content of dyadic interaction. The scales consist of four parental dimensions and two child dimensions (Responsiveness and Involvement of the adult). The scales allow adequate, marginally adequate and non-adequate levels of emotional availability to be differentiated. The Sensitivity scale measures the ability of the caregiver to attune to the infant and to respond to his emotional signals, displaying positive, adequate and authentic affect. The Structuring scale assesses the degree to which the adult appropriately scaffolds the child's play, supporting his activity and setting limits on his behavior. The Non-intrusiveness scale measures the capacity of the caregiver to be available, being there for the infant, letting herself be guided by the infant without invading or limiting his attempts to explore or his independence. The Non-hostility scale assesses the level of hostility expressed by the caregiver to the infant, demonstrated openly by intimidation or threats or more covertly by impatience, boredom or irritation.

In our study we used only maternal categories because we were focusing on mothers' caregiving. Coder reliabilities were computed for two independent trained coders on 20% of the cases and the intra-class correlation was .84. The two raters were blind to the mothers' reflective functioning and AAI classification.

Results

Preliminary analysis

We conducted some preliminary analysis to see whether the socio-demographic characteristics of the sample had an effect on the attachment, RF and mind-mindedness of the mother and on the EA scales. T-tests were used for the continuous variables and the Chi-square test (or Fisher's exact tests) was used for nominal variables. As to infant gender, the t-test showed that there were no significant differences between the two groups or in any of the Emotional Availability Scales and Reflective Functioning Scale. There were no gender differences with respect to the maternal attachment model either, χ^2 (1, N = 83) .01, p = .91, or on the AAI scales. Therefore the gender variable was not taken into consideration in subsequent analysis. As to SES, we used a two-way analysis of the t-test for independent samples to identify differences between adolescent mothers and adult mothers. A significant difference was found between the two groups, t(83) = 8.16, p = .000, showing a lower SES in adolescent mothers than in adult mothers. As to marital status, we

conducted analysis with the Fisher exact test which indicated a significant difference between adult mothers and adolescent mothers, Fisher exact test (83) = 31.85, p = .000. Therefore, in order to isolate the effect of maternal age, SES and marital status were used as covariates in the analysis.

Differences between adult mothers and adolescent mothers

Distribution of attachment models and RF

The distribution of the models of attachment of adolescent mothers was as follows: 16 mothers were classified as secure/autonomous (37%) and 28 as insecure (63%), of whom 8 preoccupied (18%), 9 dismissing (20%), 8 unresolved/disorganized (18%) and 3 unclassifiable (7%). The distribution of four-way maternal attachment in the group of adolescent mothers is similar to the distribution of US at-risk samples and of depressed mothers (van IJzendoorn and Bakermans-Kranenburg, 2009) and of Italian samples of at-risk mothers (Cassibba *et al*., 2013).

In the group of adult mothers, 27 mothers were classified as secure/autonomous (65%) and 14 insecure (35%), of whom 4 preoccupied (10%), 5 dismissing (12%) and 5 unresolved/disorganized (12%). This distribution does not differ from the distribution of US and European non-clinical samples (Bakermans-Kranenburg & van IJzendoorn, 2009) and non-clinical Italian samples (Cassibba, Sette, Bakermans-Kranenburg & van IJzendoorn, 2013).

Given the low numbers involved in the groups in the four-way and three-way distribution, in subsequent analysis the attachment variable (secure vs. insecure attachment) was dichotomized. Analysis conducted with the Chi-square test showed a significant difference between adolescent mothers and adult mothers in the two-way distribution of attachment, χ^2 (1, N = 98) = 7.38, p = .007, with more insecure attachment models in adolescent mothers.

The difference in the AAI scales between adult mothers and adolescent mothers was also analyzed. ANCOVA showed that adolescent mothers have higher scores on the Father Idealizing scale, χ^2 (1, N = 98) = 5.49, p = .022, η^2= .06, and lower scores on the Coherence of Mind scale, (1, N = 98) = 8.07, p = .006, η^2= .09.

The scores of adolescent mothers and adult mothers on the RF scale were then compared with a univariate analysis of covariance (ANCOVA) to determine whether RF differed between the two groups. Adolescent mothers (M = 2.72; SD = 1.69) had significantly lower RF scores than adult mothers (M = 4.28; SD = 1.82), F(1, 84) = 9.23, p = .003, η^2= .10.

Mind-mindedness in adult and adolescent mothers

We used a unique multivariate analysis of covariance (MANCOVA) to determine whether MM indicators differed between the two groups. The between-subject factor was adolescent/adult mother

and the covariates were SES and marital status. The multivariate tests indicated a significant group effect at multivariate level (Pillai's Trace F(8, 74) = 7.08, p = .000, η^2= .43), which is explained at univariate level by adolescent mothers using fewer appropriate mind-related comments than adult mothers, F(1, 83) = 35.01, p = .000, η^2= .30, fewer development appropriate mind-related comments, F(1, 96) = 25.20, p = .000, η^2= .23, and fewer comments of a positive valence, F(1, 96) = 7.83, p = .006, η^2= .08. Adolescent mothers also used more non-attuned mind-related comments, F(1, 96) = 8.25, p = .005, η^2= .09, and more comments which were not development appropriate, F(1, 96) = 6.50, p = .013,η^2 = .07, (see Table 2).

[Insert Table 2]

Emotional Availability Scales in adult and adolescent mothers

A multivariate analysis of covariance (MANCOVA) was used to determine whether the two groups differed as to emotional availability. Multivariate tests indicated a significant overall group effect (Pillai's Trace F(6, 72) = 6.33, p = .000, η^2= .34). The univariate tests indicated that adolescent mothers (vs. adult mothers) had lower scores on the Sensitivity, F(1, 83) = 28.81, p = .000,η^2 = .27, Structuring, F(1, 83) = 22.85, p = .000,η^2 = .22, Non-intrusiveness, F(1, 83) = 25.43, p = .000,η^2 = .24, and Non-hostility scales, F(1, 83) = 21.32, p = .000, η^2 = .21, (see Table 3). In particular, the average sensitivity score of the adolescent mothers was 3.6. This score is considered by Biringen (2008) to denote inconsistent sensitivity. However, the average sensitivity score of the adult mothers was 5.4, which is considered to be "good enough" parental sensitivity.

[Insert Table 3]

Relations between reflective functioning, attachment, mind-mindedness and emotional availability in adult and adolescent mothers

Using Pearson R correlations, the associations between RF, MM indicators, EA scales and AAI scales in both groups considered separately were analyzed.

In the group of adult mothers, the proportion of significant associations was 14.9%. RF was associated with the AAI Coherence scale, r = .33; p =. 033, and negatively associated with the Unresolved Loss scale, r = -.46; p =. 002. It was also associated positively with the EA maternal sensitivity scale, r = .32; p =. 039. Furthermore it was associated positively with mind-related comments of a positive valence, r = .48; p =. 001, and negatively with neutral mind-related comments, r = -.47; p =. 002 (see Table 4).

[Insert Table 4]

For what concerns AAI scales, the coherence scale was negatively associated with neutral mind-related comments, r = -.35; *p* =. 002. The Mother Idealizing scale was associated positively with non-attuned mind-related comments, r = .34; *p* =. 028, just like the Lack of Memory scale, r = .66; *p* =. 000. The latter scale was also associated negatively with appropriate mind-related comments, r = -.31; *p* =. 048. The Father Anger scale was associated positively with comments of a negative valence, r = .42; *p* =. 006; the Passivity and Unresolved Loss scales were associated positively with comments of a neutral valence (r = .42; *p* =. 006; r = .34; *p* =. 002). The Father Anger scale was associated negatively with the EA scale of mother non-intrusiveness (r = -.35; *p* =. 002).

There were no correlations between EA maternal scales and the dimensions of mind-mindedness examined.

In the group of adolescent mothers, the proportion of significant associations was 6%. RF was associated positively with the AAI Coherence of Mind scale, r = .71; *p* =. 000, and negatively with those of Lack of Memory, r = -.36; *p* =. 016, and Passivity, r = -.47; *p* =. 001. There were no significant associations between RF and any of the indicators of mind-mindedness being examined, nor between RF and EA scales. For what concerns AAI scales, the coherence scale was associated positively with mind-related development appropriate comments, r = .31; *p* =. 035, and the Passivity scale was associated negatively with development appropriate comments, r = -.37; *p* =. 012, (see Table 5).

[Insert Table 5]

Discussion

For what concerns the first aim of our study, results, in accordance with our hypothesis, showed significant differences between adult and adolescent mothers, controlling for SES and marital status, with respect to all the variables considered, in relation to both representational and interactional aspects.

In line with previous studies (Madigan, Moran & Pederson, 2006; Madigan, Vaillancourt, McKibbon, & Benoit, 2012; Riva Crugnola et al., 2014), the results showed a higher percentage of insecure attachment models in adolescent mothers than in adult mothers. This result could be explained by the fact that adolescent mothers have frequently had adverse infant experiences and lived in multiproblem families, factors which both facilitate the development of an insecure attachment model (Diener, Niever, & Wright, 2003; Madigan et al., 2006).

RF in adolescent mothers, an aspect which has been examined only by one other study (Riva Crugnola et al., 2016) was significantly lower than in adult mothers. It is worth noting that the average RF of the adolescent mothers in our study was comparable to the average values of the only

two studies conducted with a community sample of adolescents. In the Borelli study (Borelli, Compare, Snavely, & Decio, 2014), the females had an average RF of 2.95, while in the Taubner study (Taubner, Zimmermann, Ramberg, & Schröder, 2016), in which females and males were considered together, the RF mean was 3.99. As has been shown, the low level of mentalization in adolescents can be considered normative, given the fact that cognitive development is still in progress and given the gap in that period between the earlier maturation of the limbic affective system and the later maturation of the pre-frontal cortex (Giedd, 2005; Rutherford, Booth, Luyten, Bridgett & Mayes, 2015).

Adolescent mothers seem less adequate than adult mothers also as regards mind-mindedness, with a higher number of non-attuned mind-related verbal comments, fewer appropriate comments and positive comments, confirming the findings of Demers (Demers et al., 2010). One result which has not emerged in other studies is the difference found with respect to development appropriate and development non-appropriate comments, with adolescent mothers making more development non-appropriate comments and fewer development appropriate comments than adult mothers. The results therefore highlight the difficulty experienced by adolescent mothers in interpreting the signals and activity of their infants, and also in understanding their level of development. This is demonstrated by the lower number of mind-related, appropriate and development appropriate comments they make compared to adult mothers. The results also highlight how adolescent mothers, commenting in a way which is non-attuned and not development appropriate, tend to misunderstand their infants' signals and activities, giving them an inappropriate meaning which is therefore potentially confusing for the infant.

Emotional availability in adolescent mothers (compared to adult mothers) was also less adequate, with less sensitive styles, less capacity to structure activity and more intrusive and hostile behavior. These results are in line with those of other studies (Berlin et al., 2002; Driscoll & Easterbrooks, 2007) which, however, only examined these variables in periods of development of the child subsequent to the one considered in our study.

Our study has therefore revealed a particularly interesting result. The relationship of adolescent mothers with their child is already less adequate in the first months than that of adult mothers on two levels - behavioral and representational.

As to our second exploratory aim, the study confirms, in line with other studies, the positive association between RF and the AAI Coherence of Mind scale in adult mothers, highlighting the presence, not shown previously, of the same association in adolescent mothers. The study also showed a negative association between RF and the AAI Unresolved Loss scale in adult mothers and a negative association between Lack of Memory and Passivity and RF for adolescent mothers.

These findings, which have not been shown before, strengthen the hypothesis (Jessee et al., 2016) that there are areas of overlap between RF and states of mind relating to attachment measured with AAI.

In adult mothers the study also showed an association between adult RF and sensitivity, an area which to our knowledge has not been examined before, other studies having highlighted the association between sensitivity and parental RF. The general capacity to reflect on one's own and others' mental states measured by AAI seems therefore to be linked to the capacity to read and respond adequately to an infant's communication signals, typical of parental sensitivity. It is important in this regard to note that the EA maternal sensitivity scale assesses specifically, following the indications of Biringen (Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014), the "emotional sensitivity" of the caregiver, understood as his/her capacity to appropriately read the child's emotional cues and to be receptive to the entire range of his emotions.

Results which are worthy of note are those concerning the associations in adult mothers between scales relating to attachment and the aspects of mind-mindedness examined. The Mother Idealizing and Lack of Memory scales, considerable indicators of dismissing attachment (Hesse, 2008) were associated with non-attuned mind-related comments. The minimizing and distancing of emotions, which is typical of dismissing attachment, seems to involve, on the part of mothers with high scores on those scales, specific difficulty in attuning themselves, shown by non-attuned comments, with the activity and communication of their infant. At the same time, the Father Anger scale, a considerable indicator of preoccupied attachment (Hesse, 2008), was associated with negative mind-related comments. The typical anger of this scale seems to involve, on the part of mothers with high scores on that scale, a tendency to negatively value the activity and signals of their infant. This scale was also negatively associated with the EA non-intrusiveness scale.

Unlike the adult mothers group, in the adolescent mothers group there were no significant associations between RF and sensitivity. This result is particularly interesting since it differentiates the community sample of adult mothers from the at-risk sample of adolescent mothers. We may hypothesize that the numerous risk factors accompanying early motherhood, such as lack of social support, absence of partner, living in multiproblem families and having adverse experiences during infancy, play a greater role than RF in influencing sensitivity. Another influencing factor could be the as yet uncompleted neurophysiological development of adolescent mothers, which may influence sensitivity. The low range of RF found in adolescent mothers may also have limited the analysis of the relationship between RF and sensitivity scores.

Furthermore, in adult mothers, just as in adolescent mothers, there was no association between sensitivity and indicators of mind-mindedness. This confirms a number of studies on adult mothers

(Camberis et al., 2015) and adolescent mothers (Demers et al., 2010), contradicting others which, however, have only examined adult mothers (Meins et al., 2001). Further investigation is therefore required. Moreover, in adolescent mothers no relationship was found between RF and mind-mindedness, while in adult mothers there was an association between RF and positive comments but not between RF and appropriate and non-attuned mind-related comments. Previous studies, however, have found associations between RF and mind-mindedness, but they were examining parental RF. Only the Arnott and Meins study (2007) examined the relationship between adult RF and mind-mindedness, finding an association between RF and non-attuned mind-related comments.

With regard to these results, we must note that adult RF concerns a capacity for mentalization relating in general to attachment relationships. Therefore, we may hypothesize that adult RF in adult mothers is correlated with sensitivity measured with the EA scales, understood as the capacity to read the emotional signals of the infant, since both could be considered the expression of a more general competence of the mothers than is the case with mind-mindedness. Mind-mindedness, however, as Meins stressed (Meins, Fernyhough, & Harris-Waller, 2014) can be considered a construct which is dependent on the personal relationship of the mother with the infant rather than a trait-like quality. In particular, mind-mindedness assessed on the basis of the verbal comments of the mother about the signals and activity of the infant considered in the here and now of interaction could be influenced significantly by the interactive style and the activities undertaken by the infant himself. This is possibly the reason why mind-mindedness was not associated in our study with adult RF or with sensitivity assessed with the EA scales.

Lastly, it is important to note that all the results concerning the within-groups correlations between RF, MM and emotional availability are to be considered results which can be broadened with further studies, given the small number of participants in the two groups.

Conclusions and future prospects

To sum up, the study shows how adolescent mothers at an early stage of the development of the infant, seen as crucial for the formation of future attachment patterns (Beebe et al. 2010), have poor sensitivity and difficulty in understanding the infant's signals and in giving a meaning through verbal comments to his first activities and communication.

This inadequacy is an important risk factor for socio-emotional development and for psychopathological problems of the infant (Biringen et al., 2014). It is, in fact, well-known that poor maternal emotional availability in the first year of an infant's life is a predictor of insecure attachment on the part of the infant (Easterbrooks, Bureau, & Lyons-Ruth, 2012). In the same way, maternal intrusiveness towards the infant has been found to be predictive of subsequent

externalizing problems (Mäntymaa, Puura, Luoma, Salmelin, & Tamminen, 2004). The early difficulties shown by adolescent mothers in structuring the activity of the infant may also be a risk factor for the infant's cognitive development (Baudry, Tarabulsy, Atkinson, Pearson, & St-Pierre, 2016).

The low level of RF found in adolescent mothers in our study could be considered a risk factor with respect to their low level of mind-mindedness and sensitivity. Data analysis did not, however, show a relationship in adolescent mothers between RF and MM, or between RF and sensitivity. As we stated above, it may be hypothesized that other risk factors frequently associated with early motherhood, such as being a single parent, having little social support and having adverse experiences in childhood, may result in the low level of sensitivity and mind-mindedness of adolescent mothers. Another influencing factor – as we have seen - could be the as yet uncompleted neurophysiological development of adolescent mothers. Future studies could usefully examine the impact of these factors on mind-mindedness and maternal sensitivity. Furthermore, since this is the first study to have jointly assessed adult RF, mind-mindedness and emotional availability in an at-risk group, it would, in further studies, be useful to examine whether the absence of association is specific to adolescent mothers and their infants or whether it may be found in other at-risk groups, as has been seen in studies on parental RF and sensitivity (Pajulo et al., 2012; Schechter et al., 2008).

However, the association in adult mothers between adult RF and sensitivity, but not between sensitivity and mind-mindedness and only marginally between RF and mind-mindedness, seems to indicate, as we stated above, that adult RF and sensitivity measure a more general maternal competence with respect to mind-mindedness, the latter being considered as more dependent on the activity and responsiveness of the infant.

Furthermore, the dimensional use of the AAI scales was particularly productive in our study, showing significant associations between states of mind with respect to attachment and indicators of mind-mindedness not found by studies based on the dichotomized analysis of maternal attachment.

Our study can provide some useful indications for preventive intervention for adult and adolescent mothers. On the one side, the data on adult mothers, having shown an association between low RF and poor sensitivity, suggest the importance of working in prevention programs intended for community mothers, based on a twofold aim of promoting maternal sensitivity and increasing maternal capacity for mentalization. On the other side, the lack of association between RF and sensitivity and between RF and mind-mindedness seen in the adolescent mothers which leads to the supposition that other factors are affecting their sensitivity and mind-mindedness, demonstrates the importance of intervention programs for adolescent mothers aimed at limiting the

effect of such factors, This could be done, for example, by improving social support networks and offering mothers the chance to take part in counselling sessions to help them in the transition from adolescence to adulthood.

Our study does, however, have a number of limits. First, the size of the sample could limit the possibility of generalizing the results, in particular, as we pointed out before, those concerning the within-groups correlations between the representational and behavioral variables. Furthermore a higher number of participants would allow the adolescent mothers to be divided into two groups on the basis of maternal age so that differences in RF, mind-mindedness and EA scales between teen mothers of 15-18 and young mothers of 19-21 could be examined. Secondly, all the measurements in the study were made concurrently at infant 3 months. For this reason, in the data analysis only the associations between the various variables could be considered. Therefore, hypotheses could not be formulated as to which variable predicted the other. Lastly, we did not investigate other aspects which potentially influence the variables examined, including those relating to the infant, such as temperamental characteristics and interactive skills, variables which it would be useful to examine in future studies.

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Table 1. Socio-demographic characteristics.

	Adolescent mother-infant dyads (N = 44)	Adult mother-infant dyads (N = 41)	*p*
Mothers			
Age Mean (DS; range)	18.73 (1.67; 15-21)	32.02 (3.67; 25-40)	
Marital status			
Single	26(60%)	0	
Living with partner	7(15%)	3(7%)	.000
Married	11(25%)	38(93%)	
Socio-economic level			

Low	32(72%)	2(4%)	
Medium	12(28%)	30(74%)	
High	0	9(22%)	
Educational level			
Elementary	1(2%)	0	
Junior high school	35(80%)	5(12%)	
High school diploma	8(18%)	19(46%)	
Degree	0	17(42%)	
Primiparea	44(100%)	36(87%)	
SES Media (DS)	20.44(4.67)	34.17(10.05)	.000
Infant			
Sex			
Female	26(59%)	18(44%)	ns
Male	18(41%)	23(56%)	
Gender and AAI models			ns
Gender and EA scales			ns
Gender and RF			ns

Note. Number of subjects (N), standard deviation (SD), not significant (ns).

Table 2. Preliminary analysis.

	Adolescent (n=44)	Adult (n=41)
	M	M
Mind related total comments	4.82(1.14)	10.26(1.20)
Appropriate Mind-related comments (%)	33%	94%
Non-attunedMind-related comments (%)	67%	6%
Mind-related appropriate for infant developmental level (%)	51%	82%
Mind-related inappropriate for infant developmental level (%)	49%	18%
Neutral valence (%)	79.4%	57.8%
Negative valence (%)	5.6%	1.2%
Positive valence (%)	15%	41%

Note. Number of subjects (N), mean (M).

Table 3. Mean and standard deviations of adolescent and adult mothers on maternal EAS.

	Adolescent (n=44)		Adult (n=41)	
	M	SD	M	SD
Sensitivity	3.78	1.14	5.36	.93
Structuring	3.65	1.22	5.06	.98

Non-intrusiveness	3.81	1.14	5.29	.82
Non-hostility	4.91	1.07	6.08	.78

Note. Number of subjects (N), mean (M), standard deviation (SD).

Table 4. Correlations between RF, MM, EAS and AAI scales for adult mothers

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
RF (1)	-											
Mind-related attuned (2)	-.01	-										
Mind-related not attuned (3)	.01	-.47**	-									
MR appropriate for infant developmental level(4)	.01	.84**	-.06	-								
Mind-related inappropriate for infant developmental level (5)	-.03	-.17	.43**	-.32*	-							
MM negative (6)	-.13	.08	-.08	.07	-.08	-						
MM neutral (7)	**-.46****	.14	.23	.19	.26	-.16	-					
MM positive (8)	**.48****	.34*	-.15	.35*	-.20	.05	-.81**	-				
EAS sensitivity (9)	**.32***	.11	-.05	.19	-.23	.01	-.22	.28	-			
EAS structuring (10)	.26	.09	-.07	.20	**-.35***	.07	-.25	.28	.92***	-		
EAS non-intrusiveness (11)	.07	.01	.13	.09	-.02	-.16	.08	-.01	.67***	.72***	-	
EAS non-hostility (12)	.15	-.07	.17	.03	.00	.06	-.07	.09	.72***	.71***	.74***	-
AAI M idealizing	-.12	-.15	**.34***	.05	.02	-.12	.03	.03	-.15	-.18	-.09	-.09
AAI F idealizing	-.08	-.07	.14	.03	-.03	-.13	.10	-.08	.13	.13	.13	.10
AAI M anger	-.20	.19	-.17	.13	-.07	-.03	.10	-.03	-.14	-.08	-.26	-.25
AAI F anger	-.20	.04	.06	.02	.13	**.42****	.05	-.06	-.19	-.25	**-.35***	-.24
AAI Lack of memory	-.06	**-.31***	**.66*****	.00	.19	-.06	.21	-.15	.10	.08	.12	.23
AAI Passivity	-.24	.26	-.16	.10	.20	-.18	**.42****	-.29	-.14	-.28	-.07	-.24
AAI U loss	**-.46****	.22	-.15	.17	-.06	-.03	**.34***	-.26	-.16	-.15	-.02	-.17
AAI U trauma	-	-	-	-	-	-	-	-	-	-	-	-
AAI Coherence	**.33***	-.09	-.21	-.21	-.05	.17	**-.35***	.18	.16	.12	.18	.27

*p<.05, ** p<.01 *** p<.001.

Table 5. Correlations between RF, MM, EAS and AAI scales for adolescent mothers

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
RF (1)	-											
Appropriate Mind-related (2)	.28	-										
Not-attuned Mind-related (3)	-.01	-.39	-									
MR appropriate for infant developmental level (4)	.29	.63	.01	-								
Mind-related inappropriate for infant developmental level (5)	-.14	-.19	.77	-.34	-							
MM negative (6)	-.07	-.12	.18	.13	-.01	-						
MM neutral (7)	.13	.14	.67	.24	.64	-.16	-					
MM positive (8)	.12	.37	-.05	.41	-.12	-.09	-.19	-				
EAS sensitivity (9)	.18	.20	-.12	.11	-.07	-.07	-.17	.19	-			
EAS structuring (10)	.06	.26	-.06	.17	-.01	-.11	-.06	.14	.90***	-		
EAS non-intrusiveness (11)	.19	.07	-.16	-.03	-.01	-.05	-.25	.11	.79***	.71***	-	
EAS non-hostility (12)	.00	.13	-.12	.02	-.05	-.25	-.13	.03	.63***	.69***	.69***	-
AAI M idealizing	-.28	-.17	.14	-.23	.22	-.07	.07	-.05	-.06	-.03	-.01	.01
AAI F idealizing	-.28	.00	-.15	-.17	-.02	.06	-.14	-.09	-.16	-.12	.01	.06
AAI M anger	-.15	.05	.05	.13	-.01	.08	-.16	-.01	.24	.28	.05	.10
AAI F anger	.06	.01	.00	.14	-.11	.20	-.15	.26	.04	.04	-.13	-.12
AAI Lack of memory	**-.36***	-.29	.09	-.21	.06	.08	-.09	-.06	-.20	-.20	-.11	-.08
AAI Passivity	**-.47****	-.27	-.17	**-.37***	-.07	-.16	-.28	-.16	.00	.10	.04	.28
AAI U loss	-.18	.10	-.06	.07	-.04	.03	.08	-.08	.16	.21	.10	.00
AAI U trauma	-.20	.07	-.01	.23	-.15	.25	-.11	-.02	.00	.02	.09	.21
AAI Coherence	**.71*****	.11	.21	**.31***	.05	.12	.25	.14	.19	.11	.14	-.16

*p<.05, ** p<.01 *** p<.001.