# PSICOLOGIA

# A combination of maternal and paternal features discriminates between children with secure and insecure attachment style

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**Abstract**: Child-caregiver attachment security has been associated with positive developmental outcomes. However, many aspects related to the parenting environment, besides attachment organization, should be considered in the prediction of offspring's attachment. We aimed at building an ecological classification model of child attachment based on many variables related to the individual and dyadic features of both parents. Having recruited 150 families, we fed a stepwise logistic regression analysis, aimed at discriminating between secure and insecure child attachment. This contained information regarding parental stress, parental avoidance and anxiety in romantic relationships, quality of the romantic relationship and parental involvement. Paternal responsibility, paternal perception of the quality of the romantic relationship and maternal attachment avoidance were the most discriminative variables in the model (all *p*<.05). Findings support the importance of not limiting investigations to maternal factors, but rather making the investigation of attachment-related factors broader by assessing maternal, paternal and dyadic features.

*Keywords: Adult attachment; attachment security and insecurity; parental involvement; marital satisfaction; parenting stress.*

Attachment is an emotional bond with another person emerging in early childhood that accomplishes the infant's biological need of protection from danger (Bowlby, 1982). The repeated experiences of interactions with the attachment figures, especially in times of need, shape the expectations regarding the caregivers' availability, leading to the development of the caregiver-child attachment relationship. The qualities of this affective bond, the so-called attachment pattern, has stable and predictable features, and represent the best compromise between the infant's biologically-based attachment needs and the degree of the caregiver's availability and sensitivity (Ainsworth, 1979). Among the individual differences highlighted by Mary Ainsworth - thanks to the Strange Situation Procedure -, secure attachment, compared to insecure patterns, has been shown, over the last 30 years, to be a crucial antecedent of developmental advantages in social and emotional development across the lifespan. These long-term effects of early attachment are explained in the light of the mental representations that the child develops based on the attachment experiences, which provide a personal framework to regulate behavior and expectations both in present relationships and as new ones are constructed (Draper & Beisky, 1990; Thompson, 2008).

A central assumption of attachment theory is that individual differences in attachment organization can be transmitted across generations (Besser & Priel, 2005). In this line of reasoning, the so-called "intergenerational transmission of attachment" (Main et al., 1985; Sette et al., 2015; van IJzendoorn & Bakermans-Kranenburg, 2019) represents the process favoring continuity of attachment patterns from one generation to the next. Sensitivity, defined as the caregiver's ability to perceive child signals, to interpret them correctly, and to respond to them appropriately (Ainsworth et al., 1974), has been consistently reported as the main significant mediator of the correspondence between parents' and infants' attachment organizations (Atkinson et al., 2005; van IJzendoorn & Bakermans-Kranenburg, 2019; Verhage et al., 2018).

However, it must be noted that sensitivity alone does not explain all the variance associated with the intergenerational transmission of attachment, and the role of ecological constraints as moderators of the transmission process has been widely suggested (van IJzendoorn & Bakermans-Kranenburg, 2019; Verhage et al., 2018). Specifically, psychological attributes of both parents (e.g., parenting stress), as well as the quality of the dyadic relationship between parents and demographic and context-related variables,

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besides the quality of each parents' caregiving, may be associated with the quality of infant attachment (Belsky, 2002).

Within this context, the majority of studies has focused on the investigation of ecological factors regarding the mother, thus lacking a proper investigation of how paternal ecological influences may affect the attachment transmission (i.e., paternal involvement and sensitivity and mental representations regarding attachment). As Cabrera has said, "there is still much to learn about fathers" and in particularly on "how parent-child relationship functioning in the early years can serve as a source of emotional security that promotes healthy development across primary domains and across the lifespan" (Cabrera, 2020). Cowan and colleagues (2019) trace the history of why the role of fathers in children's development has been relatively neglected in attachment research and suggest that the transmission gap will not be fully explained until research attempts to shed some light on the role of fathers and other co-parents who play a substantial role in children's security and adaptation.

What scholars underline, moreover, is that the role of fathers cannot be simply investigated in terms of presence vs absence in the rearing context (Cabrera, 2020) or in terms of whether fathers' parenting impacts or not child's security. Indeed, according to the family systemic approach, the focus should be on how fathers play a role in relation to the multiple other factors acting in the caregiving context, e.g., fathers' and mothers' working models of attachment to their parents and partner and the couple's functioning and so on (Cowan et al., 2019; Diniz et al., 2021). This is particularly true nowadays, given the social and historical changes related to fatherhood (Cabrera et al., 2000). In relation to the development of the child's attachment, this perspective is definitely in line with the most recent re-conceptualizations of the intergenerational transmission of attachment as an ecological process with multiple constrains that need to be considered (Sette et al., 2015; van IJzendoorn & Bakermans-Kranenburg, 2019; Verhage et al., 2018).

With this respect, research shows consistently that fathers' involvement impacts children's socioemotional, cognitive and linguistic development, as well as behavioral outcomes (e.g., Cowan et al., 2019; Diniz et al., 2021; for an updated review, Fernandes et al., 2020). Restricting the focus to the topic of this study, fathers' sensitivity and mental representations regarding attachment contribute to their offspring's attachment (Lucassen et al., 2011; Monteiro et al., 2008).

More interestingly, in very recent years, there have been findings supporting the suggestion discussed above. According to these, fathers' influences on child development should be analyzed in relation to the multiple factor acting in the rearing context. For example, it has been reported that rather than only secure attachment to the mother, it is the match of secure attachment to both parents that predicts more adaptive developmental outcomes (Kuo et al., 2019) and that interparental conflict, more than each parents' parenting, predicts attachment insecurity (Lux & Walper, 2019).

While encouraging, these findings are still far from fully supporting the contextual account of the intergenerational transmission of attachment. Moreover, most research on the fathers' role in a child's attachment and developmental outcomes has been collected in US samples and very few European ones. In particular, reviews and special issues on this topic (Cowan et al., 2019; Diniz et al., 2021) lack Italian contributions which are in fact, very scant.

Thus far, the limited evidence available suggests that in Italian culture, the affective history with mothers has a stronger influence than that with fathers in the development of a child's attachment. Cassibba and colleagues' study (2017) investigated the transmission of attachment across three generations, involving the parents and grandparents of both members of each couple. The findings show that the transmission of attachment across three generations was confirmed only among the grandmother – mother – offspring triads and that any correspondence between grandmother and offspring was significantly mediated through maternal attachment representations (second generation). By contrast, it appeared interrupted in grandfather-mother-offspring triads, with the only significant impact being the mother's attachment classification on the offspring's attachment classification. It also appeared to be interrupted among the grandmother-father-offspring triads, with the only significant effect being the grandmothers' attachment on the fathers' attachment, and among the grandfather-father-offspring triads. This finding might reflect an ecological constraint related to the Italian culture. Findings have shown that Italian mothers might have more impact on their offspring's development because they are more involved in childrearing duties and have far more opportunities to interact with their children compared to fathers, both in childhood and adolescence (Bombi et al., 2011; Cerniglia et al., 2014). Nevertheless, recent investigations on Italian samples have been enlarging the focus from mothers to both parents and to the role played by marital variables in line with the systemic framework described above; although none of these studies focused on the development of the child's attachment (Camisasca et al., 2016, 2019; Miranda et al., 2016). On the other hand, Cassibba and colleagues' study (2017) is the only one investigating the intergenerational transmission of attachment in an Italian sample, by considering both mothers and fathers (besides grandparents), but where no other ecological variable was considered.

Given this extant literature, the present study has aimed at assessing whether the previously described Italian cultural constraint (with mothers being generally more involved than fathers in childrearing duties, and thus having more impact on their development) is also observable when adopting a broader ecological perspective. More specifically, we have aimed at providing some preliminary support to the ecological model predicting child attachment in an Italian sample, and at contributing to the clarification of how fathers might contribute to the quality of child attachment. In doing so, we have built a discriminative model between secure and insecure children based on many features related to both parents that have been previously associated with attachment quality variations (Cassibba et al., 2017; Cowan et al., 2019; Diniz et al., 2021; Fernandes et al., 2020) collected in mother and father parental dyads. Within such an ecological framework, we first expected that variables related to both husband-and-wife dyadic satisfaction would have led to a good classification performance of attachment security in children. Furthermore, we expected that, while maternal-related variables with the highest discriminative power would be related to attachment representations, paternal-related variables with the highest discriminative power would be those related to caregiving features, such as instrumental support for the children.

## METHOD

### Participants and procedure

One-hundred and fifty families, composed of mother, father and at least one child aged between four and fourteen years old were enrolled in the study by word of mouth within two years (2012-2014). No family was recruited within clinical or community contexts. Any family having a member affected by a physical or psychological disease/condition were excluded, as well as families in which parents were not living in the same house due to divorce or work reasons. Demographic information (i.e., age, presence of other siblings, parental and child level of education), as well as work-related information (type of work for both parents, the number of hours spent at work for both parents) were collected. Details about this preliminary data collection are reported in Table 2 for the overall sample of children, and Table 3 for the overall sample of mothers and fathers. Gender differences between secure and insecure children were assessed through the chi-square test. Age, education and number of siblings differences between secure and insecure children were assessed through *t*-tests.

### Instruments and measures

**Assessment of children's attachment.** The attachment model in four-fourteen-year-old children was assessed through the Separation-Anxiety Test (SAT; Attili, 2001). The SAT is a projective test aimed at assessing the quality of the attachment bond to the caregiver. It may be used for this purpose in children up to 14 years old. The version employed in this study (Attili, 2001) is composed of two sets of six vignettes (one set for boys, one for girls), in which caregiver-child imaginary separation situations are depicted. The separation period that every vignette aims to elicit may vary from very short to very long separations. Specifically, three vignettes aim to elicit moderate separation-related stress, while the other three aim to elicit high separation-related stress by depicting long-term separation situations that may be perceived as highly anxious. Vignettes were shown one at a time, always accompanied by a full and clear description of every character depicted. After the description of every vignette, the children were asked how a hypothetical child (not them) might feel in the situation depicted and what emotions they may experience. Later on, the same vignettes were shown again in the same order, but this time children were asked how they (instead of the hypothetical child) would feel in the situation depicted. Notably, as the SAT is a semi-projective test, its stimuli are purposefully ambiguous. For example, in one of the vignettes two adults (a male and a female) are depicted with the male standing in front of the child with a gift in his hands (either male or female, according to whether the vignette belongs to the boys' or to the girls' set), while the female stands just behind the child. After looking at this vignette, every child was asked four questions regarding feelings, motives, thoughts, and actions (i) of the child depicted in the vignette, and (ii) of them in the same situation.

The scoring procedure applied to each vignette was conducted according to a validated scoring system (Attili, 2001). Each response was scored based on 8 classes, and the score for each class ranged between -2 and 2. The 8 SAT classes are:

1. attachment: lower scores are assigned in the presence of severely negative feelings regarding separation from parents;

2. lack of self-esteem: lower scores are assigned in the presence not only of fear of separation, but also when the child mentions having the feeling of not being loved or of being rejected by caregivers.

3. hostility: lower scores are assigned in the presence of negative feelings, such as anger, and desire of punishing the caregivers for having left the child temporarily alone;

4. self-trust: higher scores are coded in the presence of positive emotions and feelings, which emphasize the pleasure of being alone and the ability to act in a goal-oriented way;

5. avoidance: lower scores indicate suppression of emotions related to separation, or the presence of answers implying denial of the separation, silence, and attempts to change the topic of the conversation that demonstrate the inability of the child to address the "separation" topic.

6. anxiety: lower scores indicate the presence of responses implying anxiety or irrational fears (monsters, ghosts). The child, besides being sad, is afraid because the parents are not reachable;

7. Out of control Anxiety / Distress: lower scores are associated with responses in which the child mentions catastrophic fears (for example, fear of being kidnapped) or that imply a desire for revenge against the parents.

8. Confusion: lower scores indicate confusion and the inability to anticipate a clear reaction to separation.

The sum of the scores assigned to each class according to the coding system (Attili, 2001) led to the final classification according to the categorical system:

Secure (B): >4
Insecure-ambivalent (C): 3 to 1
Insecure avoidant (A): 0 to -2
Insecure disorganized (D): < -3

For logistic regression analyses purposes, we assigned the "secure" label to all children falling in the SAT "B" category and collapsed "C" and "A" categories in the "insecure" label. No child was assigned the "D" category in our study. The Italian version of SAT (Attili, 2001) shows good psychometric properties with a $r = .75$ at test retest and a Cohen's Kappa .80. The SAT was scored by two independent expert coders (MT and SP) who underwent proper SAT administration and scoring training prior to the beginning of the project. The training was held by RC. Both expert coders were blind to any parental or children's information, except for the children's age and gender. The inter-rater reliability measured by Cohen's Kappa was .77.

**Assessment of the parental features.** Below are the assessments that each parent dyad recruited for this study underwent in order to gather a wide variety of information on psychological and behavioral characteristics.

***Experiences in Close Relationships Scale*** (ECR; Brennan et al., 1998). To assess the personal feelings and behaviors of each parent in the romantic relationship with the partner, the Italian version of the ECR (Picardi et al., 2000) was administered. This is a 36-item self-report questionnaire that aims to investigate the feelings and behaviors related to romantic attachment through a list of statements that are grouped in two dimensions: "anxiety about abandonment" (18 items) and "avoidance of closeness" (18 items). Participants are asked to report, on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*), their level of agreement with each of the questionnaire items. The "anxiety" factor includes intense concerns for romantic relationships, fear of being abandoned and frequent requests for greater involvement of partners; the second factor, "avoidance", includes difficult and uncomfortable feelings in approaching emotions and relying on partners. By combining the anxiety and avoidance score, it is possible to derive a categorical factor describing the quality of the romantic attachment style in 4 categories that are equivalent to the classification of attachment styles proposed by Bartholomew (Bartholomew, 1990): Secure (low avoidance - low anxiety), Preoccupied (low avoidance - high anxiety), Dismissing-Avoidant (high avoidance - low anxiety) and Fearful-Avoidant (high avoidance - high anxiety). In this study, we have focused on continuous scores of ECR anxiety and avoidance obtained by both mothers and fathers. The Italian version of ECR demonstrated good internal consistency, with a Cronbach's alpha (α) of .85 for Anxiety and .86 for Avoidance dimensions (Picardi et al., 2000). In our study, internal consistency coefficients were α = .79 for Anxiety and α = .81 for Avoidance dimensions.

***Dyadic Adjustment Scale*** (DAS) (Spanier, 1976). The quality of the romantic relationship within parental dyads was assessed through the Italian version of the DAS (Rollè et al., 2017), which is a self-report measure used both in clinical and research settings, with good psychometric properties. A full description of the instrument is reported in Supplementary Information. For analysis purposes, the DAS overall score, reported by both mother and father within each dyad, were used. In an Italian study (Rollè et al., 2017), the

average internal consistency coefficient was α = .76. Within this study, the internal consistency coefficient was α = .72.

***Parental Involvement Questionnaire*** (PIQ)*. This questionnaire has been specifically developed within this research project. The theoretical basis of the concept of parental involvement has been previously described by Lamb (Lamb, 1987). More specifically, according to Lamb, parental involvement relies on three factors: accessibility, responsibility and involvement. Accessibility refers to the presence and practical availability of the parent towards the child. Responsibility concerns the way the parent participates in several daily childrearing duties (i.e., participation in the choice of the practitioner, the management of the appointments, the selection of the babysitter, the management of the after-school time, taking care in case of illness, speaking with teachers). Finally, emotional involvement refers to the experience of direct contact with the child, expressed as the amount of caregiving activities and interactions shared with the child. This questionnaire has been completed by both parents in order to evaluate (i) their own parental involvement in the care of the child (i.e., self-reported) and (ii) the respective partner's parental involvement (i.e., other-reported). In the present study, the mean of self-reported and other-reported scores of both paternal and maternal parental involvement scores (accessibility, responsibility, emotional involvement) were used in the analyses. Detailed information about the construction of the questionnaire and its final items are reported in Supplementary Information. We conducted an exploratory principal component analysis (PCA) on 45 initial items (both for self-reported and other-reported form) that showed the existence of three principal components mirroring Lamb's three dimensions of parental involvement: accessibility, responsibility, and involvement. This three-factor solution was based on 20 out of the original 45 items. (see Supplementary Information for details on item saturations). Thus, the final PIQ form administered to parents within our study was composed of 20 items. The variance explained by the three factors altogether for the self-reported form of the PIQ was 39.8%, while for the other-reported form was 39.4%: sufficiently satisfactory results. After the PCA, we tested the internal consistency of the 20-item PIQ forms. Overall, for the self-reported score, the internal consistency coefficient was α = .68, while the other-reported score was α = .66. For the accessibility dimension, the self-reported internal consistency was α = .68, and α = .66 for the other-reported one. For the responsibility dimension, the self-reported internal consistency was α = .65, while for the other-reported one it was α = .69. For the involvement dimension, the self-reported internal consistency was α = .68, and α = .65 for the other-reported one. In this study, we focused on the mean of self-reported and other-reported scores of both paternal and maternal parental involvement scores (accessibility, responsibility, emotional involvement).

***Parenting Stress Index*** (PSI; Abidin, 1990)*. This is a questionnaire used to identify any stressor within the parent-child relationship that may negatively affect the child's normal development and functioning. We employed the PSI in its short form (Abidin, 1990), and a detailed description of the questionnaire and its scoring procedures is reported in Supplementary Information. For analysis purposes, a total summary score, for both mother and father, was employed. In an Italian study (Rollè et al., 2017), the average internal consistency coefficient was α = .93, while in our study it was α = .81.

Table 1 presents the total number of variables used for the statistical analyses, divided per instrument administered. The Table also reports the mean and standard deviation scores for each subscale's raw distribution.

**Analytic plan**

Using IBM SPSS Statistics 22 (www.ibm.com), a logistic regression analysis was used to investigate whether maternal and paternal psychological and behavioral ecological characteristics could significantly predict children's attachment security/insecurity. Therefore, a total of 14 variables (5 events per variable, which fits the statistical design according to previous literature (Vittinghoff & McCulloch, 2007) were included in the stepwise regression framework. Raw scores were feature-wise transformed in $z$ scores in order to uniform their format. $Z$ scores from each feature entered the stepwise logistic regression analysis using the forward selection method. Significant predictors were retained only if they were associated with the label (secure child vs insecure child) with $p < .05$.

In order to verify whether the stepwise regression model's performance was associated with any demographical confounding variables, Pearson's $r$ correlation analyses were conducted between the residual scores of the stepwise regression model and, respectively, (i) children's age, (ii) children's gender, (iii) parental education level. Furthermore, in order to investigate whether our psychological and behavioral model predicting children's attachment security/insecurity could be associated with other non-psychological variables related to the familial environment, Pearson's $r$ correlation analyses were conducted between the residual scores of the stepwise regression and the number of working hours of both

parents. In each analysis, when nominal variables were involved, we derived dummy variables from the nominal variables to insert them in the statistical design. Results were multiple comparisons-corrected ($p$ < .05) through the False Discovery Rate (FDR) method (Benjamini & Hochberg, 1995).

**Table 1.** List of psychological measures administered to both mothers and fathers, and variables assessed that were entered in the logistic regression analysis as predictors ($N$ = 14).

| Instrument/measure | Administered to | Construct/variable | Mean | SD |
|---|---|---|---|---|
| Experiences in Close Relationship | Mother | Maternal anxiety | 44.31 | 19.41 |
| | | Maternal avoidance | 43.10 | 21.45 |
| | Father | Paternal anxiety | 48.82 | 25.51 |
| | | Paternal avoidance | 56.81 | 25.68 |
| Dyadic Adjustment Scale | Mother | Maternal dyadic satisfaction | 52.69 | 6.13 |
| | Father | Paternal dyadic satisfaction | 50.49 | 5.14 |
| Parental Involvement Questionnaire | Mother and Father | Maternal accessibility | 3.25 | 0.60 |
| | Mother and Father | Maternal responsibility | 3.35 | 0.52 |
| | Mother and Father | Maternal emotional involvement | 3.40 | 0.34 |
| | Mother and Father | Paternal accessibility | 3.55 | 0.56 |
| | Mother and Father | Paternal responsibility | 3.65 | 0.49 |
| | Mother and Father | Paternal emotional involvement | 3.66 | 0.35 |
| Parenting Stress Index | Mother | Mother-child perceived stress | 75.69 | 24.20 |
| | Father | Father-child perceived stress | 84.82 | 12.11 |

**RESULTS**

**Preliminary analyses.** No significant differences were found between secure and insecure children in terms of age of parents, of children, of gender distribution, of children education, and on the number of other siblings in the family (see Table 2). Notably out of the 68 insecure children, 35 had an avoidant attachment style and 33 had an anxious-ambivalent attachment style.

**Logistic regression analysis.** Stepwise logistic regression analysis revealed that child attachment security could be predicted based on 3 significant features out of the initial 14 variables: maternal ECR avoidance score, which was negatively associated with attachment security ($t$ = -0.58, $p$ = .002); paternal PIQ mean score in the responsibility subscale, which was positively associated with attachment security ($t$ = 0.45, $p$ = .015); and paternal total DAS score, which was negatively associated with attachment security ($t$ = -0.36, $p$ = .045). The regression model composed of these 3 features could significantly predict child attachment pattern (security vs. insecurity) with a 67.3% accuracy (true positives = 63, true negatives = 38, false positives = 30, false negatives = 19, percentage of correct classification of secure cases = 76.8%, and percentage of correct classification of insecure cases = 55.9%).

**Table 2.** Demographic characteristics and related preliminary analyses for the children included in the study.

| Children's characteristic | All ($N$ = 150) | Secure ($n$ = 82) | Insecure ($n$ = 68) | $p$ value (secure vs. insecure) |
|---|---|---|---|---|
| Male/Female ratio | 76/74 | 39/43 | 35/33 | .75 |
| Age (months): mean (SD) | 98.00 (33.83) | 101.26 (33.36) | 94.05 (34.23) | .19 |
| Age (years old): mean (SD) | 8.16 (2.82) | 8.43 (2.78) | 7.83 (2.85) | .19 |
| Year of education: mean (SD) | 5.81 (3.16) | 6.12 (3.14) | 5.44 (3.18) | .18 |
| Number of children in family: mean (SD) | 1.77 (0.67) | 1.78 (0.68) | 1.76 (0.67) | .88 |

**Table 3.** Demographic characteristics of mothers and fathers included in the study.

| Parents' characteristic | Mothers ($N$ = 150) | Fathers ($N$ = 150) |
| --- | --- | --- |
| Education | | |
|     Middle school and below: % | 41.3 | 62.0 |
|     High school and above: % | 58.7 | 38.0 |
| Work | | |
|     Secure salary: % | 16.0 | 84.0 |
|     Insecure salary: % | 26.0 | 8.7 |
|     Unemployed: % | 58.0 | 7.3 |
| Number of work hours: mean (SD) | 4.78 (3.05) | 7.46 (3.59) |
| Age (years): mean (SD) | 37.51 (5.60) | 40.94 (5.72) |

**Association analyses**. Pearson's $r$ correlation analysis revealed no significant association between residual scores from the previous logistic regression and (i) children's age ($p$ = .06), (ii) children's gender (corrected multiple comparisons, $p$ = .22), (iii) parental education level (respectively, corrected maternal education multiple comparisons $p$ = .68 and corrected paternal education multiple comparisons $p$ = .19). Furthermore, no association between number of work hours and residual scores was found for both parents (respectively, corrected maternal work hours multiple comparisons $p$ = .49 and corrected paternal work hours multiple comparisons $p$ = .95).

## DISCUSSION

The aim of this study was to provide an ecological model based on both maternal and paternal psychological and behavioral variables, which was able to correctly discriminate between secure and insecure children. While we suggested that maternal features might have been the most influential ones, together with the paternal, related to caregiving, we found that the most discriminative combination of variables investigated within the stepwise regression model was composed of paternal responsibility, paternal marital satisfaction and maternal romantic attachment avoidance, thus partially supporting the predicted results. This combination could correctly discriminate secure vs insecure children with 67.3% of accuracy. Notably, residual scores from this model were not associated with demographical confounding variables (i.e., children's age, children's gender, parental education level, and both parents' number of work hours).

Our findings support the hypothesis that, when adopting a broader ecological perspective, childhood attachment pattern seems to be associated with both maternal and paternal individual and dyadic factors. This is in contrast with existing findings showing that Italian mothers might have more influence on the development of their children due to their higher involvement in daily-life activities with them, compared with fathers (Bombi et al., 2011; Cerniglia et al., 2014), thus suggesting the presence of a potential ecological constraint. Therefore, our findings do not support the view for which maternal-related factors would have more impact on the quality of attachment in children due to their higher involvement in routine activities. Indeed, in our model, we initially found a positive association between paternal PIQ mean score in the responsibility subscale and security of attachment in children. Interestingly, this measure aggregates, for each partner, both the self-reported and the partner-reported perceptions, while most studies assessing father involvement normally use only father-reported measures (Diniz et al., 2021). Our assessment may have guaranteed greater validity due to the multi-informant approach and may be an innovative aspect of this study. In a culture, such as the Italian, in which, as has already been mentioned, the role of the mother in the management of parenting practices is prevailing, especially in the South where the data were collected, having a responsive father can be particularly advantageous. A child is then able to rely on two central caregivers (the mother, but also the father) who responsibly take care of him/her. This can mean having many more opportunities and occasions to experience that basic trust in the world that it is one of the essential foundations for the development of secure attachment patterns.

We also found that the overall quality of the dyadic relationship perceived by the father, as measured by DAS, was negatively associated with children's attachment security. This appears as a non-intuitive finding, as it would suggest that the higher the couple satisfaction, the less the security of the children. Positive quality of the family atmosphere and of the marital relationship, and greater social support for the wife/mother, are instead largely deemed as indirect protective factors of the quality of attachment within family conflict and separation studies (Clawson et al., 2018; Merrilees et al., 2008). However, our sample does not specifically include families with relationship difficulties and indeed excludes families with experiences of divorce or separation due to work. This suggests that the quality of couple satisfaction could be a variable positively associated with secure attachment in the cases of more problematic families, while in the more "ordinary" families the paternal perception of couple satisfaction could be a dimension that

indirectly signals less attention to the care of the child, with negative consequences on the development process of the child's attachment. In other words, the quality of couple satisfaction could be a protective factor for the development of a qualitatively positive attachment in families with conflicts or with a complicated management of daily routines. With other family situations, especially the paternal perception of couple satisfaction should be carefully evaluated from the perspective of family homeostasis and reciprocal "ecological" relationships between all family members.

Arguably, lower maternal avoidant attachment may also foster greater paternal involvement in terms of responsibility, in a circuit that favors more likely pathways of secure attachment for the child. A lower maternal avoidant attachment may also imply better paternal couple satisfaction, but this may not be enough to ensure a care environment that is effective for the development of the child's secure attachment. The substantial difference, therefore, seems to be carried out by the paternal responsibility and the instrumental dimension associated with it.

In short, our work may suggest the following new hypothesis. A lower maternal avoidant attachment is a basic dimension for the child's development of a more positive and secure attachment, while the paternal satisfaction with the quality of the couple is a dimension that, when considered alone, can be problematic. However, if paternal responsibility is present, the interaction between these three variables could be positive and promote safer attachment processes for the child. More generally, these preliminary findings suggest the need to investigate both parents' perceptions of their romantic relationship and their impact on the child's attachment development. We may speculate also on the importance, for future studies, to explicitly embed time-related variables in our model. Indeed, from a biopsychological perspective (Brofenbrenner, 1994), it would be important to understand whether our results may be partly explained by chrono-systemic variables (i.e., by the time-related and sociohistorical conditions in which child development occurs). For example, studies have shown that, over time, the accumulation of adult experiences across early, middle and late adulthood shapes their parenting abilities (initially aiming at meeting children's basic needs, and then gradually supporting autonomy and transition into adulthood, REF). This parallels the evolution of the broader social and historical system in which parents find themselves moving into the parenting practices. Future studies are warranted to highlight the potential role of the chronosystem in impacting the participation of fathers – and its subsequent crucial role in the child attachment development – according to sociohistorical and individual experience variation.

The main limitation of this study is represented by the participants' broad age range. Investigating smaller age ranges would have unfortunately dramatically reduced the sample. Future studies focused on specific and separate developmental periods (i.e., early childhood, late childhood, puberty, early adolescence) should specifically assess the validity of our findings. Another limitation is constituted by the cross-sectional nature of the recruitment procedures, which intrinsically limit the potential developmental and clinical implications that might be derived from our findings. Future studies should also attempt to add those involved in the intergenerational transmission of attachment to these ecological predictors related to the caregiving environment. In other words, both the parents' states of mind with respect to attachment and sensitivity in interaction with the child. Moreover, it should be taken into account that, despite the number of secure children being higher than that of insecure children recruited within our study, the secure-insecure proportion in our sample is slightly different than those previously described in the literature (e.g., see the seminal paper by Ainsworth et al., 1979 - 70% secure, 30% insecure). We think this is a random effect, as our recruitment procedures were entirely based on word of mouth and did not involve any clinical or community contexts. Given that, future studies on a larger sample with a different secure-insecure proportion are warranted to validate and further test the generalizability of our findings. This is crucial also given the fact that the PIQ questionnaire has been specifically developed within this project. Despite its adequate psychometric potential, future studies are warranted to externally validate our findings not only to larger cohorts, but also to other measures.

Nevertheless, we believe that this study constitutes a first preliminary attempt to investigate attachment pattern by considering ecological determinants from a real-world scenario perspective, therefore taking in account several potential influences from the different family actors. Our findings support the importance of not limiting research to individual maternal factors, but rather of making the ecological investigation broader through a thorough assessment of maternal, paternal, and dyadic dispositions. Future investigations should employ multivariate techniques and multiple validation samples in a longitudinal framework to understand the concrete applicability of this classification model within primary prevention of attachment insecurity contexts.

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**SUPPLEMENTARY MATERIAL**

**1. Parental Involvement Questionnaire (PIQ)**

For the construction and definition of the items, first of all, extensive work was done to find literature examples of behaviors that could refer to the construct and to the factors investigated (Lamb, 1987). In this way, we have come to a first form of the questionnaire which consisted of 45 items (15 for each factor); then the questionnaire was administered to a random sample of 50 pairs of parents. Below are reported the final 45 items of the PIQ questionnaire (the questionnaire has been administered in Italian):

1. After work, I spend most of my time at home
2. I like to play with my child
3. I can easily understand the needs of my child
4. I take home some of the work to be completed
5. I accompany my child to school
6. I try to respond in a timely manner to the needs of my son / daughter
7. Even when I'm at home, I always think about work
8. I participate actively in the school activities of my child (performances, meetings with teachers, afternoon activities)
9. I let my wife comfort my child when he cries or it's sad
10. When I'm at home, I spend most of my time committed to activities related to my personal interests (hobby, sport)
11. I let my wife decide my free time management son / daughter
12. I get up during the night when my child wakes up or calls
13. When I'm at home, I spend most of my time engaged in domestic activities (home work, reorganization, meal preparation)
14. I help my child to wash and get dressed
15. Help and give advice to my child in times of difficulty
16. When I'm at home, I work most of my time with my child (homework, games, care)
17. I accompany my child to the pediatrician
18. It is easy for me to understand the emotions and behaviors of my / a son / daughter
19. My wife blames me for spending little time with our partner son / daughter
20. Me and my wife share important decisions regarding our child (pediatrician, school, baby sitter)
21. I am affectionate with my child and I like being so
22. I willingly sacrifice my commitments and part of my time for my son / daughter
23. I accompany my son to bed at night
24. Upon returning from work, I ask my son to tell me how spent the day
25. I am willing to stay with my child whenever he / she me ask for it
26. I prepare meals for my child and help him to eat
27. I satisfy the requests and wishes of my child
28. I like to spend most of my free time on my own son / daughter
29. I share my hobbies and interests with my child
30. I leave it to the wife to decide the rules and to ensure that my / a son respects them
31. Even when I'm at home I prefer it to be someone else a take care of my child
32. I accompany my child to a friend's house
33. I am in conflict with my child
34. I help my wife with housework
35. I am well acquainted with the friends my child attends
36. My child confides willingly with me
37. When my wife is at work or engaged in chores maids take care of my child
38. I help my child in the performance of school tasks
39. A glance is enough to understand my child
40. If I can, I prefer to stay at home when my child is sick / a
41. I participate in all the activities of my child (sport, hobby, school, catechism)
42. I am happy to talk about my problems with my child
43. Every day I try to carve out some time to devote only to my child
44. I let my child manage his free time alone
45. If there is any problem, I discuss and give explanations to my child rather than pissing me off

The items that refer to the Accessibility factor are: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40.43; the items that refer to Responsibility factor are: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44; instead, the items that refer to the Emotional Involvement factor are: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45.

The entire questionnaire is taken out through a five-point Likert scale for each item (1 = never, 2 = rarely, 3 = sometimes, 4 = thick, 5 = always). From these scores, it is possible to obtain three different scores, one for each factor, reflecting the sum of the scores that the subject has given to all the items belonging to a given factor. The higher the score, the greater the level of parental involvement across the three different factors.

## 2. Parenting Stress Index

The Parenting Stress Index (PSI) (Abidin, 1986, 1990) is a questionnaire used to identify any stressor in the parent-child relationship, which on the one hand can compromise the normal development and functioning of the child, and on the other hand can also originate dysfunctional parenting behaviors; this tool appears be useful for assessing the level of perceived stress of the parent, in the care of the child. The theoretical assumption is that the stress related the parenting may be related to certain characteristics of the child, of the parent himself, and of a series of situations closely related to the role of parent. The short form was used in this study (PSI / SF - Parenting Stress Index / Short Form; (Abidin, 1990), in its Italian version developed and validated by Guarino and colleagues (Guarino A., 2008), which derives directly from the extended form and it turns out to be easier to administer and interpret. From a structural viewpoint, the instrument consists of 36 items, divided into 3 subscales, each composed by 12 items:

• Parental distress - PD (items 1-12): defines the stress level that the parent is experimenting, resulting from personal factors directly related to the parental role ;

• Dysfunctional parent-child interaction - P-CDI (items 13-24): evaluates both the extent to which the parent perceives the child as not responding to his expectations, as well as the extent to which interactions with the child does not reinforce him as a parent ;

• Difficult child - DC (items 25-36): focuses on some fundamental characteristics of the child's behavior, especially referring to his temperament, including also behavioral challenging patterns disobedience. To these three scales, we also added a Defensive Response score (DIF) that evaluates the degree to which the subject responds to the questionnaire with a tendency to give more favorable self-image, minimizing the indications relative to problems or stress in the relationship with the child. We also added a Total Stress score, which provides an indication of the total level of parental stress that an individual is experiencing. For the administration, the parent is asked to indicate on a 5-point scale its degree of agreement with what is written in each item; the five choice options are: FA (strongly in agreement), A (agreement), I (unsafe), D (disagreement), FD (strongly disagreement). For scoring, instead, to each of these alternatives chosen a score is assigned, for which FA = 5, A = 4, I = 3, D = 2, FD = 1; to get the score of each of the 3 subscales it is needed to add the individual scores given by the subject to each single item that makes up the scale. The Total Stress score is given instead of the sum of the subscale scores (Total Stress = PD + P-CDI + DC), and the Defensive Response score (DIF) is given, finally, from the sum of the scores obtained only to some items, namely items 1, 2, 3, 7, 8, 9 and 11, and a raw score of equal or below 10 should be seriously considered. Indeed, in this case, in the parent tends to represent himself as highly competent, free of emotional stress normally associated with the parental role, or does not invest in the role of parent for whom he does not experience the associated stresses. All of these raw scores, they are then reported in a special scoring sheet, from which it is possible to derive the percentile based on the age of the child. Generally, the normal range for scores is between the 15th and 80th percentile.

## 3. Dyadic Adjustment Scale

Dyadic Adjustment Scale (DAS) (Spanier, 1976), validation and translation Italian edited by Gentili et al., (Gentili P., 2002). It is a tool for self-assessment of the quality of couple relationship. The DAS scale was born from a criticism of quality of the Locke-Wallace Marital Adjustment Test (L-W MAT) (Locke, 1959) and from latter proposes to evaluate the individual perception of the marital relationship. DAS is a self-report tool: it measures the general adaptation of each partner to the marital relationship and the subjective perception of the quality of the relationship. The DAS scale consists of 32 items divided into

four scales:

• Scale 1: dyadic consensus - 13 items that measure the degree of agreement / disagreement between the two partners regarding issues of everyday life (religion, friends, finance management family, free time, home organization).

• Scale 2: dyadic satisfaction - 10 items that measure the level of tension present within the relationship of couple and any thoughts related to a break in the relationship itself; these are items that therefore evaluate the degree of happiness / unhappiness perceived by partners in the relationship. The items take into account the frequency of the quarrels, the pleasure of the being together as a couple and any thoughts related to divorce or separation. High scores recorded in this scale indicate the presence of marital satisfaction and the propensity to continue the relationship.

• Scale 3: affective expression -  5 items that measure the degree of individual satisfaction with the expressions of affection within the relationship (sexuality included). The items evaluate how the couple shows feelings, love and sexuality.

• Scale 4: dyadic cohesion - items that measure the degree of sharing of activities and interests within and outside of the domestic walls. Evaluate the amount of time in which partners share pleasant activities such as social interests, common goals and possibilities for dialogue.

• Overall scale: dyadic adaptation - the sum of the four scales, providing a total score that expresses the degree of general agreement of the couple.

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