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The Perinatal Assessment of Paternal Affectivity (PAPA): Italian validation of a new tool for the screening of perinatal depression and affective disorders in fathers

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**Abstract**

**Background:** Questionnaires for the screening of paternal perinatal psychological distress are based on clinical manifestations expressed by women, showing limitations in capturing the wide array of signs and symptoms exhibited by men. The current study aimed to validate the Perinatal Assessment of Paternal Affectivity, a new self-report tool for the screening of paternal depressive and affective disorder.

**Method:** This study used a cross-sectional design with a 3-month test-retest, involving respectively 385 (T1) and a sub-sample of 111(T2) fathers. Confirmatory factor analysis (CFA) was performed to test structural validity and concurrent validity was assessed by Spearman correlations. We assessed reliability using McDonald's ω and ordinal alpha. Group differences in PAPA scores based on sociodemographic were also tested.

**Results:** The CFA reported a one factor structure as the optimal solution. The PAPA also showed adequate reliability and internal consistency as well as acceptable test–retest indices. Concurrent validity was confirmed by significant correlations between PAPA total score and standardized test scores. Non-Italian fathers and fathers who experienced recent stressful life events reported higher PAPA scores.

**Limitations:** Our sample was not homogeneous in terms of nationality and most of the participants, were from Northern Italy. Some risk factors associated with paternal parental psychological distress (e.g., unplanned pregnancy) have not been considered.

**Conclusion:** This study provides initial evidence of validity and reliability of the PAPA as a brief and sensitive screening tool to detect signs and symptoms of paternal affective disorder during both prenatal and postnatal period.

**Keywords:** Fathers, Paternal, Perinatal, Depression, Affective disorder, Screening

## 1. Introduction

Although literature on perinatal mental health has been mainly focused on mothers, transition to parenthood is a critical period for both parents. Adjustment to fatherhood implies significant psychological and neuroendocrine changes with possible consequences for paternal health, self-concept and couple relationship (Abraham et al., 2014; Swain et al., 2014; Fisher et al., 2018; Feldman et al., 2019; Mangialavori et al., 2021). These adjustments can negatively affect paternal mental health and marital satisfaction (Figueiredo and Conde, 2011; Parfitt and Ayers, 2014; Baldoni et al., 2020), undermining the ability of fathers to respond adequately to child behaviors and needs (Lucassen et al., 2011; Koch et al., 2019). Importantly, new fathers reported depressive symptoms with a frequency that is almost three times greater than the general population (Fletcher et al., 2015). In this regard, the term Paternal Perinatal Depression (PPND) has been used to define a clinical condition that fathers may manifest from their partner's pregnancy to the first year after childbirth (Baldoni, 2016; Bruno et al., 2020). According to recent metanalytic findings (Rao et al., 2020), the prevalence rates of PPND across countries range from 7.82% to 13.59%, affecting 9.76% of fathers during the prenatal period. This result is consistent with previous meta-analyses (Paulson and Bazemore, 2010; Cameron et al., 2016), confirming the urgency to implement routine screening for identifying early signs of depression in fathers (Field, 2018; Walsh et al., 2020).

To date, a large body of research has focused on factors associated with perinatal depression in fathers, including individual health, couple life, pregnancy outcomes, and child development. Specifically, country of origin (Cameron et al., 2016), multiparity (Figueiredo and Conde, 2011), history of previous psychiatric illness, unplanned pregnancy (Chhabra et al., 2020), previous stressful life events (Mangialavori et al., 2021) and marital adjustment have been reported to affect mental health in expectant fathers. Considering the growing concern about paternal perinatal distress and its detrimental effect on couple and family outcomes, an appropriate screening practice may play a fundamental role for identifying at-risk fathers, who could benefit from psychological

support and treatment. However, several critical issues could limit the effectiveness of screening practice for paternal perinatal distress.

Following a gender-sensitive approach (Baldoni and Giannotti, 2020), the expression of perinatal psychological distress in men can be displayed not only with common depressive-like symptoms, but rather through a wide array of clinical manifestations. Although fathers may experience depressive mood, loss of interest, social isolation, withdrawal from relationships, insomnia, loss of sexual desire, attention difficulties and loss or increased appetite, male depressive symptoms are generally milder and less defined than in mothers. Moreover, depression may occur frequently in comorbidity with other disorders, in particular anxiety disorders (e.g., PTSD, panic attacks, phobias, GAD and OCD) with a prevalence ranging from 4.1 to 16% (Leach et al., 2016). In addition, fathers may manifest other psychological or behavioral problems such as anger attacks (verbal and/or physical, breaking or throwing objects), behavioral acting outs (e.g., compulsive physical or sexual activities, extra-marital relationship, relational problems, violence and couple quarrels), abnormal illness behavior (e.g. somatization, functional medical syndromes, chronic pain, hypochondriac complaints), addictions (smoking, alcohol, drugs, compulsive use of smartphone, computer or internet, gambling, porn addiction) as a result of a loss of impulse control (Innamorati et al., 2011; Martin et al., 2013; Baldoni, 2016; Madsen, 2019). These externalizing and behavioral strategies can be used by fathers to express their psychological distress (Bronte-Tinkew et al., 2007; Baldoni and Giannotti, 2020; Mangialavori et al., 2021) and should be considered as depressive equivalents since they can overlap or mask a depressive condition in men (Abramowitz et al., 2001; Martin et al., 2013; Madsen, 2019; Baldoni et al., 2021). For this reason, it has been proposed (Baldoni and Giannotti, 2020) to replace the term PPND with the more comprehensive definition of Paternal Perinatal Affective Disorder (PPAD) to encompass the broad range of clinical manifestations associated with perinatal psychological distress in fathers. Thus, it can be assumed that the notion of PPAD incorporates in a single and inclusive construct different components associated with perinatal psychological distress in fathers.

Moreover, compared to women, men show a lower tendency to manifest their emotions and are less likely to seek help for psychological difficulties, maybe due to the adherence to traditional social gender norms (Grossmann and Wood, 1993; Heifner, 1997; Moller-Leimkuhler, 2002; Baldoni and Ceccarelli, 2010; Baldoni and Giannotti, 2022). Fathers' reluctance to seek help along with the presence of depressive equivalents might have contributed to make paternal depression more difficult to diagnose and treat.

Another important limitation for the detection of early signs of PPAD is that existing screening/diagnostic tools have been developed based on traditional depressive symptoms expressed by women. Thus, they are not sensitive and specific enough to capture the wide array of depressive equivalents manifested by men during the perinatal period (Madsen and Juhl, 2007). The most commonly used measures are self-report questionnaires, through which men are more likely to recognize themselves to be under stress or to complain about somatic preoccupations rather than acknowledging depressive and emotional symptoms (Matthey et al., 2003; Baldoni and Agostini, 2013; Baldoni and Giannotti, in press). For instance, the Edinburgh Postnatal Depression Scale (EPDS; Cox, 1986; Cox et al., 1987; Loscalzo et al., 2015), the most widely used tool for the screening of perinatal affective disorders during the transition to parenthood, does not consider gender differences in the expression of perinatal affective disorder. In fact, although the use of different cut-off scores in males was recommended (Matthey et al., 2001), the use of the EPDS to screen for anxiety disorders needs further investigations (Matthey, 2008). In addition, it does not include specific items to assess somatization and externalizing behaviors that have been often reported by new fathers. A Swedish study (Psouni et al., 2017) showed that a subgroup of at-risk fathers exclusively reported depressive equivalent, assessed with the Gotland Male Depression Scale (GMDS; Walinder and Rutz, 2001). Considering these limitations, the presence of early signs of PPAD is still underestimated and therefore underdiagnosed and undertreated (Musser et al., 2013; Mangialavori et al., 2021; Baldoni and Giannotti, 2020, 2022).

Given the lack of gender-sensitive measures targeting the complex clinical picture of perinatal affective disorder in fathers, Baldoni et al. (2016a, 2016b) developed the Perinatal Assessment of Paternal Affectivity (PAPA). Preliminary findings showed that PAPA total score reflecting perinatal paternal affective symptoms correlated with measures of depression, psychological distress, and couple adjustment (Baldoni et al., 2016a, 2018).

The present study aimed to validate the PAPA on a sample of 385 Italian fathers. First, we tested the hypothesized one-factor structure of the PAPA using confirmatory factor analysis (CFA). Second, we assessed internal consistency and three-month test-retest reliability. Third, we explored associations between PAPA scores and relevant external criteria, such as depressive symptoms, psychological distress, perceived stress, and dyadic adjustment.

## 2. Method

### *2.1. Participants*

Out of 391 recruited fathers, six fathers (1.5%) did not complete the questionnaire, thus the total sample of this study consisted of 385 participants (mean age = 35.68 years, SD = 6.31, range 21–58 years). The majority of participants were Italian (n = 329, 85.5%), while 56 fathers (14.5%) were foreigned-born. Two-hundred fifty-one participants (62.5%) were primiparous and 134 (34.8%) reported to have experienced one or more stressful life events in the previous six months. A sub-sample of 111 participants (28.8% of the total sample; mean age = 35.59, SD = 6.52) completed the same questionnaire after 3 months from the first assessment (post-partum) for the test-retest reliability. Descriptive statistics of the study samples are displayed in Table 1.

**Table 1**

Characteristics of the study participants for the first (prenatal) and second (postnatal) assessment.

| Variable | Categories | Prenatal (N = 385) | Postnatal (n = 111) | $\chi^2$ | *p* value |
|---|---|---|---|---|---|
| Nationality | Italian | 329 (85.5%) | 75 (67.5%) | 27.6 | <0.001 |
| | Foreign | 56 (14.5%) | 36 (34.5%) | | |
| Residence | Northern Italy | 221 (57.4%) | 103 (92.8%) | 43.6 | <0.001 |
| | Central-Southern Italy | 164 (42.6%) | 8 (7.2%) | | |

| | | | | | |
|---|---|---|---|---|---|
| Education | Primary school | 3 (0.8 %) | 1 (0.9%) | 0.71 | =0.86 |
| | 1st degree | 46 (11.9 %) | 15 (13.5%) | | |
| | 2nd degree | 197 (51.1%) | 56 (50.5%) | | |
| | University | 127 (33.1%) | 34 (30.6%) | | |
| | Missing | 12 (3.1%) | 5 (4.5%) | | |
| Job | Unemployed | 40 (10.4%) | 12 (10.8%) | 10.2 | <0.001 |
| | Employed | 345 (89.6%) | 99 (89.2%) | | |
| Marital status | Single | 17 (4.4%) | 8 (7.2%) | 1.98 | =0.57 |
| | Separate | 9 (2.3%) | 1 (0.9%) | | |
| | Cohabitee | 155 (40.3%) | 41 (36.9%) | | |
| | Married | 186 (48.3%) | 50 (45.1%) | | |
| | Missing | 18 (4.7%) | 11 (9.9%) | | |
| Number of children | 0 | 251 (65.2%) | 18 (16.2%) | 1.20 | <0.001 |
| | 1 or more | 134 (34.8%) | 74 (66.7%) | | |
| | Missing | 0 (0%) | 19 (17.1%) | | |

* $p < 0.05$. ** $p < 0.001$. *** $p < 0.001$.

*2.2. Procedure*

The present study used a cross-sectional design with a 3-month test- retest. Participants were recruited from three Italian primary healthcare services between January 2017 and September 2019. Participation in the study was proposed by clinical psychologists to parents at the third trimester of pregnancy during regular gynecological routine visits. Inclusion criteria were age ≥18 years, partners in the third trimester of pregnancy and being Italian speakers. Exclusion criteria were maternal and/or fetal health problems such as pregnancy-induced hypertension, medical disorder complicating pregnancy, chromosomal abnormalities in the fetus, pregnancy complications (e.g., abnormal placenta position, poor fetal growth), threatened preterm labor and current psychiatric diagnosis. The second assessment for test-retest was completed during the scheduled follow-up postnatal visit. Participants were informed of the purposes and methods of the current study. Fathers who accepted to participate signed a written informed consent, including information on data protection and privacy. The study obtained Ethical approval from the regional Institutional Review Board (CEIIAV, n.1607).

*2.3. Measures*

*2.3.1. Socio-demographic data*

Socio-demographic information included age, nationality, marital status, education, occupation, number of children and the presence of stressful life events (e.g., job loss, divorce, mourning) in the previous six months.

*2.3.2. The Perinatal Assessment of Paternal Affectivity (PAPA)*

The PAPA (Baldoni et al., 2016a, 2016b, 2018) is a new self-report questionnaire designed as a screening measure to provide a global score of paternal perinatal distress, consistently with the comprehensive definition of PPAD. This scale has been developed with the aim to identify fathers at risk of developing a perinatal affective disorder and it does not serve a diagnostic purpose. It consists of 8 items assessing anxiety, depression, perceived stress, irritability/anger, relationship problems (including couple, family, friends and at work), abnormal illness behavior (somatization, functional medical syndromes, hypochondriac complaints), physiological problems (sleeping, eating, or sexual desire), and addictions (smoking, drinking alcohol, taking drugs, gambling, compulsive use of the Internet) and other risky behaviors (such as driving at high speed, dangerous sports or taking unnecessary risks at work). Respondents are asked to rate the severity of their symptoms and behaviors in the last two weeks using a four-point Likert type scale (0 = Not at all, 1 = A bit, 2 = Moderately, 3 = A lot). Three additional items, including two open questions, are not considered in the total score. The questions consist of: a) perceiving the symptoms described above as related to fatherhood, b) feeling happy with being, or becoming a father; c) reporting additional aspects to better describe his feelings over the last two weeks.

The PAPA was developed by the collaboration of a group of experts in perinatal psychopathology who first autonomously suggested a sample of items. The test was originally developed in English and subsequently translated into Italian based on the back translation technique (Table 2).

*2.3.3. Depressive symptoms*

Depressive symptoms were assessed through the Center for Epidemiologic Studies Depression Scale (CES–D) (Radloff, 1977), a widely used 20-item self-report measure. Respondents are asked to rate how often they experienced the described symptoms (e.g., “I felt that I could not shake off

the blues even with help from my family or friends") during the past week. Items are rated on a four-point scale (0 = never to 3 = always). The CES-D showed good validity and reliability (Dershem et al., 1996) and it has been widely used in the assessment of depression in fathers and mothers during the perinatal period (Paulson et al., 2016). In the current study, we used the validated Italian version of the CES-D (Fava et al., 1982). Reliability estimate in the present study was $\alpha = 0.714$.

*2.3.4. Psychological symptoms*

We used the Symptom Checklist-90-Revised (SCL-90-R; Derogatis and Melisaratos, 1983), a 90-item self-report questionnaire for the assessment of a wide range of psychological symptoms. Participants are asked to rate the severity of their symptoms (e.g., poor appetite) during the last week using a five-point scale (0 = not at all to 4 = extremely). The SCL-90-R includes 9 subscales: Somatization, Obsessive- Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism, as well as three global indexes (Global Severity Index, GSI; Positive Symptom Distress Index; Positive Symptom Total). The instrument has good psychometric properties (Müller et al., 2010) and it has been used to assess mental health during the perinatal period across different countries (Shaw et al., 2009; Nolvi et al., 2016). For this study, we adopted the Italian validated version of the SCL-90 (Prunas et al., 2012). Specifically, we used the GSI scale as a measure of psychological distress. Reliability estimate in the present study was $\alpha = 0.948$.

*2.3.5. Perceived stress*

Prenatal stress was assessed using the Perceived Stress Scale (PSS; Cohen et al., 1983). This 10-item self-report scale measures feelings and thoughts related to perceived stress during the last month (e.g., "In the last month, how often have you found that you could not cope with all the things that you had to do?"). Participants rate how often they felt stressed on a five-point Likert scale (from 0 = never to 4 = very often). The PSS has shown adequate reliability and construct (Cohen et al., 1983) and it has been previously used during the perinatal period (Liou et al., 2014).

The Italian version of the PSS (Fossati, 2010) was used in the current study. Reliability in this study was $\alpha = 0.751$.

*2.3.6. Dyadic adjustment*

To assess couple adjustment, we used the Dyadic Adjustment Scale (DAS; Spanier, 1976), a self-report questionnaire which includes 32 items measuring relationship quality in married or cohabiting couples. The DAS consists of 4 subscales: dyadic satisfaction, dyadic cohesion, dyadic consensus, and affectional expression. Respondents rate each item (e.g., "In general, how often do you think that things between you and your partner are going well?") on a five- or six-point scale (e.g., 0 = always agree to 5 = always disagree), while two items require a dichotomous answer (Yes = 0, No = 1). This scale has revealed adequate reliability and validity (Spanier, 1976). and it has been widely employed to assess couple adjustment during the perinatal period (Mazzeschi et al., 2015; Pilkington et al., 2015). For this study, we used the Italian version of the DAS (Garbarini et al., 2014). Reliability in this study was $\alpha = 0.892$.

*2.4. Data analysis*

Item descriptive statistics, including skewness and kurtosis, were preliminarily examined. Items were considered outside of normal distribution if skewness and kurtosis were above |2| and |7|, respectively (Finney and DiStefano, 2006). To test the hypothesized one-factor model of the PAPA, confirmatory factor analysis (CFA) was applied. We used the robust weighted least squares (WLSMV) estimation method, which is recommended with non-normal ordinal variables (Beauducel and Herzberg, 2006). We considered the following indices and thresholds for adequate model fit: root mean square error of approximation (RMSEA) $\leq 0.08$, comparative fit index (CFI) and Tucker-Lewis index (TLI) $\geq 0.95$ (Hu and Bentler, 1999), and weighted root mean square residual (WRMR) $\leq 1.0$ (DiStefano et al., 2018). After fitting the CFA model, we examined modification indices and expected parameter change to identify any additional adjustments (Saris et al., 2009). The impact of model re-specification was tested using the adjusted $\chi^2$ difference testing

($\Delta\chi^2$) with the DIFFTEST function in Mplus (Muthén and Muthén, 2012). A significant adjusted $\Delta\chi^2$ test would indicate that model fit has improved.

To assess reliability, McDonald's $\omega$ and ordinal $\alpha$ were computed, with values >0.70 indicating adequate internal consistency (McDonald, 1999a, 1999b; Nunnally, 1978). For test-retest reliability, the intraclass correlation coefficient (ICC) was used with values ≥0.60 considered as acceptable (Anastasi, 1988). To explore evidence of validity based on relations to other variables, correlation coefficients (Spearman's $\rho$) were computed between PAPA and CES–D, PSS, GSI-SCL-90, and DAS scores. Tests of differences in PAPA scores based on primiparity (Yes *vs* No), nationality (Italian *vs* Other), and stressful life events (None *vs* One or more) were carried out using Mann-Whitney *U* tests.

Sample size was determined a priori to have at least 10 observations for each freely estimated parameter in the CFA model (Kline, 1998). Statistical significance was set at $p \leq 0.05$. For effect size interpretation, Spearman's $\rho$ of 0.10 was considered small, 0.30 medium, and 0.50 large (Cohen, 1988), and $\varepsilon^2$ of 0.04 was considered small, 0.25 medium, and 0.64 large (Ferguson, 2009). CFA was performed with Mplus 7 (Muthén and Muthén, Los Angeles, CA, USA). All other analyses were performed using IBM SPSS 25 (IBM, Armonk, NY, USA).

## 3. Results

### *3.1. Item analysis*

As shown in Table 2, item descriptive statistics indicated univariate normality for six items but deviations from normality for item 2 and item 8. Considering the lack of univariate normality and the ordered categorical nature of the items, the WLSMV estimator was selected as the best choice for CFA on our data.

**Table 2**

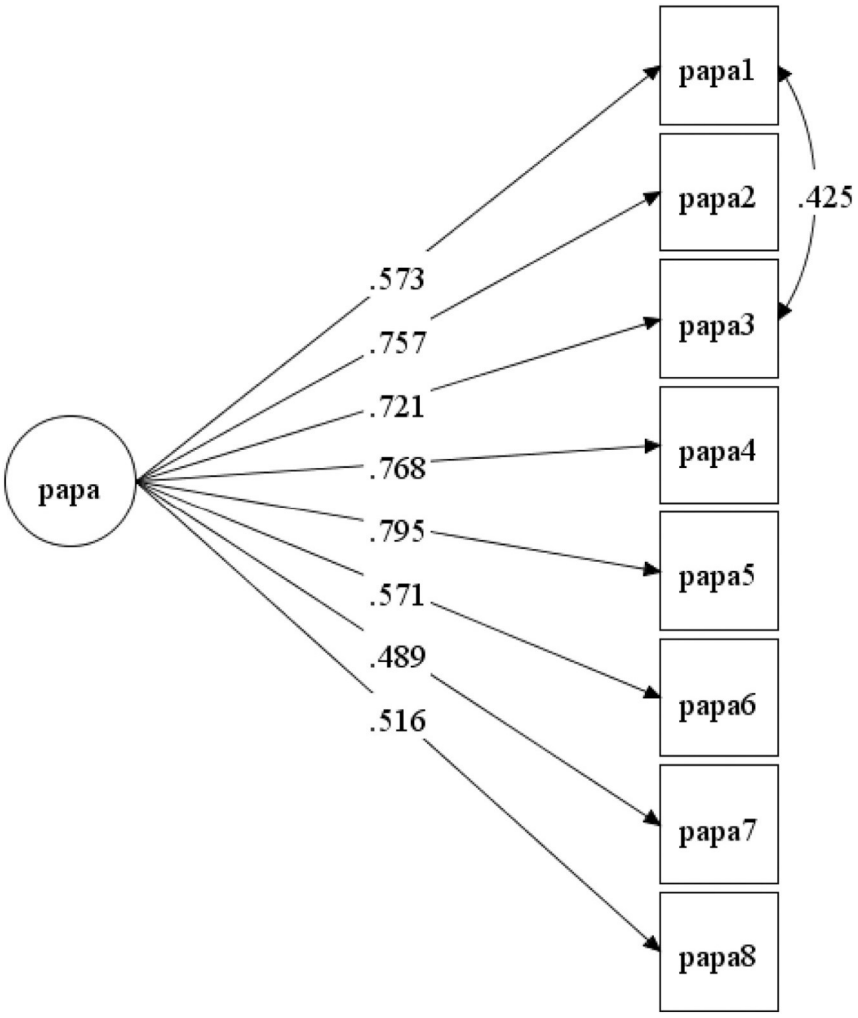
The Perinatal Assessment of Paternal Affectivity (PAPA).

| Item | Italian version | English version | Mean | Standard deviation |
|---|---|---|---|---|
| 1. Anxiety | Teso, ansioso o preoccupato | Tense, anxious or worried | 0.96 | 0.76 |
| 2. Depression | Triste, giù di morale o depresso | Sad, down, upset or depressed | 0.21 | 0.46 |
| 3. Stress | Sotto pressione, stressato | Under pressure, stressed | 0.87 | 0.79 |
| 4. Anger | Irritabile, arrabbiato o polemico con gli altri | Irritable, angry, or had arguments with others | 0.67 | 0.80 |
| 5. Interpersonal | Ho avuto più del solito difficolta nel rapporto con gli altri o altri ` hanno avuto difficolta nel rapporto con me (la mia compagna, familiare, amici, sul lavoro, ecc.) | I've had difficulties getting on well with others, or others have had difficulties getting on well with me more than usual (e.g., my partner, family members, in-laws, friends, at work, etc.) | 0.37 | 0.59 |
| 6. Somatization | Fisicamente male (mal di testa, dolori muscolari o articolari, problemi digestivi, gastrointestinali, cardiologici o di pressione, disturbi urinari, ecc.) (anche uno solo di questi) | Physically unwell (e.g. headaches, muscular or joint pains, digestive, gastrointestinal, heart or blood pressure problems, urinary disorders etc.) (one or more of these) | 0.51 | 0.70 |
| 7.Sleep, Eating and Sexual Desire | Ho avuto problemi a dormire, nel mangiare o nel desiderio sessuale (anche uno solo di questi) | I have had some problems with sleeping, eating or sexual desire | 0.56 | 0.71 |
| 8. Addiction and Risky Behaviors | Ho sentito più del solito il bisogno di fumare, bere alcolici, assumere droghe, giocare d'azzardo o utilizzare internet, oppure dedicarmi ad attività pericolose (guidare a velocità elevata, praticare sport rischiosi, mettermi inutilmente in pericolo sul lavoro, ecc.) (anche uno solo di questi comportamenti) | I have felt the need to smoke, drink alcohol, use drugs, gamble or use the internet more than usual; or felt the need to take risks (e. g., driving very fast, doing dangerous sports, unnecessary risks at work, etc.) (one or more of these) | 0.25 | 0.55 |

*3.2. Factor model*

The fit of the one-factor model was below acceptable standards, $\chi^2_{31} = 82.740$, $p < 0.001$, RMSEA = 0.090, CFI = 0.953, TLI = 0.934, WRMR = 1.056. Inspection of modification indices suggested that freely estimating the residual correlation between item 1 and item 3 would decrease the model $\chi^2$ by 27.842, with an expected parameter change of 0.254. Thus, we re-specified the model by including this item measurement correlation. The re-specified model had an acceptable fit according to all indices, $\chi^2_{19} = 55.448$, $p < 0.001$, RMSEA = 0.071, CFI = 0.973, TLI = 0.960, WRMR = 0.853, which was significantly better than that of the original model ($\Delta\chi^2_1 = 25.234$, $p < 0.001$). Standardized factor loadings ranged between 0.49 and 0.80 ($p < 0.001$). Figure 1 shows the path diagram with the final model of the PAPA. A total score (ranging from 0 to 24) was calculated by summing the eight items.

**Figure 1.** Measurement model with standardized parameters.



*3.3. Reliability*

McDonald's $\omega$ was 0.860 and ordinal $\alpha$ was 0.852, indicating adequate internal consistency. As for test-retest reliability, ICC was 0.59 (95 % CI 0.41–0.72) indicating moderate temporal stability.

*3.4. Relations to other variables*

PAPA scores positively, significantly correlated ($p < 0.001$) with the criterion variables CES-D ($\rho$ = 0.44), GSI ($\rho = 0.67$) and PSS ($\rho = 0.51$) with medium-to-large effect sizes. The PAPA negatively, moderately correlated with DAS total scores ($\rho = -0.42$, $p < 0.001$).

Group differences in PAPA scores based on socio-demographic variables such as nationality, number of children and stressful life events were examined using Mann-Whitney tests. No significant differences were found between primiparous and multiparous fathers ($U$ = 17,485, $z$ = 0.64, $p = 0.51$). Conversely, there were significant differences between groups based on nationality ($U$ = 10,624.50, $z = 2.056$, $p = 0.04$, $\varepsilon^2 = 0.01$) with foreign fathers reporting higher PAPA scores compared to Italian fathers. Significant differences were also found based on the presence of stressful life events ($U$ = 18,256, $z = 2.746$, $p = 0.006$, $\varepsilon^2 = 0.02$), with fathers who experienced one or more stressful life events during the previous six months, reporting higher PAPA score than fathers who reported no stressful events.

## 4. Discussion

The main purpose of this study was to propose and psychometrically test a new screening tool for the assessment of paternal perinatal affective disorder. The PAPA can be used to detect early signs of psychological distress in fathers during the transition to parenthood. We tested the factor structure, internal consistency, and relations to other variables of the PAPA questionnaire.

*4.1. Factor structure of the PAPA*

Confirmatory factor analysis indicated non-optimal fit for the original measurement model, yet subsequent adjustments based on modification indices were sufficient to meet adequate model fit. We allowed covariation between the error terms of two items referred to anxiety (item 1) and stress (item 3). Such covariation makes intuitive and theoretical sense, as it is reasonable that the error

terms of these items share some variance. Indeed, both items refer to similar aspects such as tension, worries and feeling under pressure for dealing with new roles and responsibilities. Moreover, it is in line with prior research on paternal health during transition to parenthood (Philpott et al., 2017, 2019) showing a robust link between anxiety and stress in new fathers. Altogether, CFA results indicate that the eight indicators of psychological difficulties experienced by fathers during the transition to parenthood (i.e. anxiety, depression, stress, anger, interpersonal difficulties, somatization, sleep/eating/sexual desire and addiction/risky behaviors) belong to the same latent construct, and support the computation of a global PAPA score. In fact, unlike women, the expression of perinatal depression in fathers may occur along with other psychological symptoms which may overlap or mask it (Baldoni and Giannotti, 2020). Consistently with previous research (Leach et al., 2016), anxious symptoms during the perinatal period may be even more frequent than depression, thus constituting a significant dimension to consider in screening practice. Similarly, literature has shown that fathers may exhibit externalizing symptoms as depressive equivalents (e.g., anger attacks, relational conflicts, and addiction) as well as somatic disorders as an expression of abnormal illness behavior (Martin et al., 2013; Madsen, 2019; Mangialavori et al., 2021) from the prenatal period. These clinical manifestations may be linked to loss of impulse control, unbalanced reaction to their own body, somatic functioning and difficulties in mentalizing and arousal regulation. Taken together, all the items of the PAPA covering traditional symptoms along with depressive equivalents and externalizing behaviors pertain to a single comprehensive factor. In this regard, the umbrella definition of Paternal Perinatal Affective Disorder (PPAD) appears more appropriate in capturing the broad range of clinical manifestations reported by men before and after childbirth (Baldoni and Giannotti, 2020). Thus, it is desirable that screening activities with fathers adopt a gender-specific approach to detect the wide array of early signs through which fathers may express perinatal psychological distress.

### *4.2. Internal consistency and construct validity of the PAPA*

The questionnaire also showed good internal consistency. As for test- retest reliability, the moderate stability we found over a 3-month interval is coherent with the inherent nature of the construct under assessment. The neurobiological alterations (Feldman et al., 2019; Bakermans-Kranenburg et al., 2019) and changes in social roles and routines (Saxbe et al., 2018; Baldoni and Giannotti, 2022; Baldoni et al., 2021) which characterize transition to parenthood may partially explain the moderate temporal stability of the questionnaire, Relations of PAPA scores to other relevant parenting-variables were significant according to our hypotheses. Positive correlations were moderate with depressive symptoms (CES–D) and strong with psychological distress (GSI) and perceived stress (PSS) (Mao et al., 2011; Kamalifard et al., 2014). In addition, there was a moderate, positive association between PAPA and DAS scores, which is in line with the well-established link between paternal psychological distress and couple relationship quality across transition to parenthood (deMontigny et al., 2013; Koh et al., 2015). These findings indicated that the PAPA taps into a distinct and a more comprehensive construct than perinatal depression or general distress.

The differences in PAPA scores based on socio-demographic variables were not significant, except for nationality. Non-Italian fathers reported slightly higher PAPA scores. This suggests that belonging to a foreign minority in Italy could entail greater difficulties for fathers and a greater risk of developing a perinatal affective disorder. A possible explanation is that non-Italian fathers may have job or financial strain and low social support, which have been identified as significant risk factors for paternal mental health during adjustment to parenthood by recent meta-analyses (Chhabra et al., 2020; Wang et al., 2021). Moreover, fathers who reported one or more stressful life events during the last six months showed higher PAPA scores. This is in line with prior research documenting that recent negative life events are associated with paternal mental health during perinatal period (Mangialavori et al., 2021; Wang et al., 2021). No group differences were found based on parity (primiparous vs multiparous fathers). This is in line with meta- analytic evidence highlighting no moderation effect of parity on prevalence rate of paternal depression (Cameron et al., 2016). Nevertheless, it is in contrast with a recent study which indicate that parity affects

perinatal mental health in men (Chen et al., 2019). Thus, further studies are needed to unravel these contradictory findings.

*4.3. Limitations and future directions*

Our findings should be interpreted in light of some limitations. Firstly, we did not correlate fathers' scores with scores of their partners on specific dimensions (e.g. on the CES–D). Our sample was not homogeneous in terms of nationality, with 14% of fathers who were foreign-born. An Italian questionnaire was used for all, and this may constitute a drawback, as the questions can be interpreted differently based on cultural tendencies related to parenting. Another limitation for the representativeness of the sample is that most of the participants, particularly in the test-retest subsample, were from Northern Italy. In addition, as a self-report tool, the PAPA may be subject to defensive processes since sensitive issues such as affective and relational problems are disclosed. Finally, to collect more evidence of validity and reliability, further studies are needed that include clinical samples and other relevant risk factors associated with paternal parental psychological distress (e.g., unplanned pregnancy, work-family conflict). Importantly, future analyses should adopt a dyadic perspective and consider associations also with partner's variables, since partner adjustment to parenthood constitutes a prominent risk for paternal perinatal health (Paulson and Bazemore, 2010; Thiel et al., 2020).

## 5. Conclusion

Although research on fatherhood has increased significantly in the last two decades, the evaluation of paternal perinatal affective disorders is still an unsolved issue. Most healthcare professionals (pediatricians, gynecologists, midwives, nurses, neonatologists) are not yet prepared to recognize the complexity of male distress signals and symptoms during the transition to parenthood. Self-report questionnaires are often used to screen fathers, but only a few of these tools have been validated for a male population showing several methodological limitations (Baldoni and Giannotti, 2020). Only a limited number of tools, such as the recent DDads Questionnaire developed by a group of Belgian researchers (Vermeulen and Buyl, 2021) were developed specifically to assess

fathers during perinatal period. To date, the PAPA is the only screening questionnaire that considers paternal perinatal distress considering not only depression and anxiety but also externalizing symptoms (such as anger attacks, relational conflicts, and addiction) and somatic disorders as an expression of abnormal illness behavior.

This study provides initial evidence of validity and reliability of the PAPA as a brief and simple screening tool to detect signs and symptoms of paternal perinatal affective disorder during both prenatal and postnatal period. The PAPA is very easy to administer and not time- consuming and does not require specific training. Importantly, it has no diagnostic purpose, but focuses mainly on screening at-risk fathers, who may experience psychological or behavioral difficulties at an early stage of adjustment to parenthood. After identifying fathers at-risk, perinatal professionals should conduct further assessments, particularly through clinical interviews, in order to better understand paternal and family needs, and, if necessary, to offer personalized psychological support or treatment. Thus, the PAPA is proposed as a first screening tool to recognize the potential vulnerabilities of fathers during perinatal period using a gender-sensitive approach. The use of the PAPA may also increase paternal involvement in early child health services according to a family system ecological perspective (Cabrera et al., 2018; Bakermans- Kranenburg et al., 2019). In conclusion, findings of this study suggest that the PAPA is a one-factor tool with adequate reliability and validity.

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**CRediT authorship contribution statement**

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**Conflict of Interest**

None.

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