Parental care and overprotection predict worry and anxiety symptoms in emerging adult students

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ABSTRACT

Anxiety disorders represent a prevalent mental health concern, with escalating rates, especially among emerging adults. University students, in particular, face a myriad of academic and life stressors that can amplify feelings of worry and anxiety. While early parental bonding seem to predict anxiety disorders later in life, the applicability to emerging adult students and its applicability to predict sub-clinical and transdiagnostic anxiety features remain unclear. This study aims to examine *i)* the relationship between demographic variables and key features of anxiety disorders (i.e., worry and anxiety symptoms); and *ii)* the predictive association between early parental bonding and anxiety-related features. A sample of 370 university students in Italy ($n = 279$ females; *M age* = 20.84 years, *SD age* = 1.81 years) completed the Parental Bonding Instrument, the Penn State Worry Questionnaire, and the Beck Anxiety Inventory. Females reported higher levels of worry and anxiety compared to males. Significantly higher worry and anxiety symptoms were reported by individuals who experienced *affectionless control* (low care and high overprotection) as compared to those exposed to *optimal parenting* (high care and low overprotection). Predictive models indicated that scores of parental care (i.e., the principal component between maternal and paternal care scores) and parental overprotection (i.e., the principal component between maternal and paternal overprotection scores) are robust predictors of worry and anxiety symptoms. However, this relationship showed a gender-specific pattern: lower parental care was more significant in predicting anxiety features in males, while high overprotection was more significant in females. The findings contribute to the comprehension of the risk factors influencing the susceptibility of emerging adult students to anxiety disorders.

1. Introduction

Anxiety disorders are among the most prevalent mental health issues and significantly impair one's quality of life and functioning (Szuhany & Simon, 2022). The fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* categorizes anxiety disorders into specific phobias, generalized anxiety disorder, panic disorder, social anxiety disorder, separation anxiety disorder, selective mutism, and agoraphobia (American Psychiatric Association, 2013). Each anxiety disorder has its unique clinical profile. For instance, social anxiety disorder is characterized by feelings of fear and anxiety in social situations. Despite their differences, anxiety disorders also share common features, such as heightened worry (i.e., an uncontrollable mental activity focused on the perceived likelihood of future negative events (Pruzinsky & Borkovec, 1990)) and feelings of anxiety, which may manifest as physical symptoms (e.g., increased heart rate, muscle tension, and restlessness) (Kertz et al., 2012).

Recent reports indicate a rising prevalence of anxiety, with a particular increase among emerging adults, defined as individuals aged between 18 and 29 (Goodwin et al., 2020; Slee et al., 2021). For example, an epidemiological study conducted in Germany estimated that nearly one-fourth of adolescents or young adults meet the criteria for a lifelong anxiety disorder (Niermann et al., 2021). In the Italian population, the prevalence of anxiety disorders peaks during adolescence (ages 15–19) and young adulthood (ages 20–24), then progressively decreases (Our World in Data, 2024). Moreover, anxiety is not equally prevalent across genders. Indeed, females are two/three times more likely to screen positive for anxiety than males (Asselmann & Beesdo-Baum, 2015; Eisenberg et al., 2007).

Several factors contribute to increasing the susceptibility to psychopathology observed in adolescence and emerging adulthood (Asselmann & Beesdo-Baum, 2015). For instance, during these periods, the brain undergoes profound structural modifications. Cerebral white matter volume increases, while cortical grey matter volume and

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thickness decrease, with cortices supporting high-level cognitive processes that continue to develop into the twenties or thirties (Foulkes & Blakemore, 2018; Mills et al., 2016; Tamnes et al., 2017). These changes may reflect modifications at the cellular level of the brain, such as myelination of axons, axonal growth, and synaptic reorganization, which in turn modulate the brain's neuroplasticity, making it particularly sensitive to environmental experiences (Genc et al., 2023; Giorgio et al., 2008).

In addition to the neural changes, emerging adulthood represents a psychologically challenging period marked by uncertainty, instability, identity exploration, growing possibilities, and the sense of being "in-between" (Arnett & Tanner, 2006; Iannattone et al., 2023). In recent years, this period has become a distinct developmental phase due to the shift from an industrial to an information-based economy (Arnett, 2006). This transition has increased the demand for postsecondary education while delaying the traditional milestones of job entry, marriage, and parenthood (Crocetti et al., 2015; Tanner & Arnett, 2016). Emerging adults navigate the acquisition of adult roles while abandoning adolescent roles, facing physical, cognitive, and psychosocial changes. In interviews conducted by Smith et al. (2011), emerging adults described this life stage as troubled, confusing, and depressing. Collectively, the challenges of emerging adulthood pose a significant risk for the exacerbation of anxiety disorders (Paus et al., 2008). Among emerging adults, Reifman et al. (2007) found that university students exhibit an even higher sense of possibilities compared to their working counterparts. However, students may also perceive higher instability compared to their working peers, who view their lives as more secure and stable (Crocetti et al., 2015). For this reason, university students, in some instances, might be a population particularly susceptible to anxiety and anxiety disorders. They not only deal with the typical challenges of emerging adulthood but also face stressors inherent in academic life, such as academic pressure and irregular sleep patterns (Fischer et al., 2020; Mofatteh, 2021; Newcomb-Anjo et al., 2017). Ultimately, the exposure to continuous academic and life stressors may contribute to the exacerbation of anxiety and anxiety disorders (Sakin Ozen et al., 2010).

Besides adolescence and emerging adulthood per se, a series of genetic and environmental risk factors increases people's susceptibility to the development of anxiety. Among the environmental factors investigated in the scientific literature, the quality of early interactions with caregivers has received wide attention and seems a consistent predictor of anxiety later in life (Giakoumaki et al., 2013; Jinyao et al., 2012; Kidd et al., 2022; McLeod et al., 2007; Rapee, 1997; Reitman & Asseff, 2010; Shimura et al., 2017). From a psychological point of view, the first years of life are paramount for one's emotional and psychological development (Bowlby & Holmes, 2012). In this period, the experience of adverse parental practices can create vulnerability to various psychiatric disorders through their interaction with other factors, such as personality and self-esteem (Avagianou & Zafiropoulou, 2008; Shimura et al., 2017). In particular, it seems that having experienced early relationships characterized by low care and high overprotection is more likely associated with higher levels of anxiety as an adult (Bennet & Stirling, 1998; Carter et al., 2001). While the dimension of care refers to the emotional warmth and closeness in the relationship, the dimension of overprotection derives from the degree of control and intrusion in the relationship. In the pioneering study by Parker et al. (1979), undergraduate students who reported the combination of low maternal care and high maternal overprotection were more likely to have higher anxiety than others. In this, the maternal relationship emerged as pivotal in linking early experiences with the later onset of anxiety. Similar results were observed by Reitman and Asseff (2010), who showed that, for both females and males, perceptions of higher maternal control and lower paternal acceptance were strongly associated with student anxiety.

Recently, Kidd et al. (2022) conducted a systematic review of 57 studies to investigate the relationship between parental bonding and mood and anxiety disorders. In their article, the authors identified 14 studies that assessed this relationship specifically in anxiety disorders,

all utilizing the Parental Bonding Instrument (PBI) (Parker et al., 1979). The quantitative analyses presented in the review support the observation that patients with anxiety disorders tend to report differences in parental care and overprotection compared to healthy individuals. However, the patterns of these differences vary across specific anxiety disorders. For instance, patients with panic disorder and social anxiety disorder reported lower scores in maternal and paternal care, but higher scores in maternal and paternal overprotection. Conversely, patients with generalized anxiety disorder tended to report higher maternal care and paternal protection. These individuals also experienced more instances of *neglectful parenting* (low care and low overprotection) and *affectionless control* (low care and high overprotection) compared to *optimal parenting* (high care and low overprotection) and *affectionate control* (high care and high overprotection). Furthermore, the analysis of studies involving various anxiety disorders found small effects of overprotection (with higher scores in patients with anxiety disorders) but no significant effect of care. However, as discussed by the authors, the systematic review was based on studies that included groups with diagnosed psychiatric disorders but did not provide information on specific symptoms of these psychiatric illnesses.

Focusing on core symptoms of anxiety disorders, rather than on diagnostic groups, and the factors that predict them has several advantages. This approach allows for obtaining a transdiagnostic understanding, as many of the underlying mechanisms and symptoms are shared across anxiety disorders, and explaining the varying patterns of parental bonding observed across different diagnostic groups. Moreover, focusing on the symptoms allows using a dimensional approach, where both clinical and sub-clinical levels are taken into account. This is particularly relevant in populations with an increased risk for psychopathology, such as emerging adult students, where sub-clinical symptoms might be informative for early intervention and prevention strategies. Despite being paramount, little research has used this dimensional approach to investigated how parental bonding is associated with transdiagnostic features of anxiety disorders, such as worry and anxiety. This gap is especially pronounced concerning populations at higher risk for anxiety disorders, such as emerging adult students (see, for instance, Feng et al. (2022); Williams and McKinney (2024); Reitman and Asseff (2010) for studies investigating social and cognitive precursors of anxiety and worry in this population). For this reason, the current study aims to elucidate the relationship between demographics, experienced parental bonding, and core features of anxiety disorders (i. e., worry and anxiety symptoms) in a non-clinical sample of emerging adults who are university students in Italy. More specifically, the study will investigate: *i)* how worry and anxiety symptoms vary between males and females; *ii)* the relationship between age and worry and between age and anxiety symptoms; *iii)* the intensity of worry and anxiety symptoms across parental bonding; *iv)* the way in which demographic information (gender and age) and parental bonding together predict worry and anxiety symptoms. It is hypothesized that females will report higher scores for both worry and anxiety symptoms as compared to male students. Moreover, we hypothesize that younger students will show higher scores of worry and anxiety, in agreement with recent epidemiological data collected in the Italian population (Our World in Data, 2024). In fact, younger students have just begun the transition toward adulthood and face numerous challenges in adjusting to the new environment. Finally, we hypothesize that higher worry and anxiety symptoms will be predicted by less optimal patterns of parental care (low care and high overprotection).

2. Methods

2.1. Study design

The current study is based on data investigating demographic information, the trait of worry, and anxiety in emerging adults who are university students in Italy. All variables were assessed with a self-report

questionnaire administered online. In the study, we employed: *(i)* the PBI to collect participants' parental bonding with their mothers and their fathers; *(ii)* the Penn State Worry Questionnaire (PSWQ) to assess the trait of worry; and *(iii)* the Beck Anxiety Inventory (BAI) to assess participants' anxiety symptoms. All data were collected anonymously via a questionnaire administered online. All participants were informed about the study and provided informed consent. Participants received no compensation for taking part in the study. The study was conducted with the approval of the Ethics Committee at the University of Trento (approval number 2022–061).

2.2. Participants

The study involved a total of 402 participants. The minimum sample size was determined based on published questionnaire-based studies (e. g., (Donnelly et al., 2013; Jimeno et al., 2022)). People who did not initially provide informed consent ($n = 1$) or reported a history of neurological or psychiatric disorders ($n = 27$) were excluded from participating in the study. Additionally, participants above 29 years old ($n = 4$) were excluded to focus on the emerging adult population. The final sample comprised 370 university students, with 279 females (75.41 %), 85 males (22.97 %), and 6 non-binary individuals (1.62 %). The age range of the participants was between 18 and 29 years old (*Mean (M)* = 20.84 years; *Standard Deviation (SD)* = 1.81 years). Among them, 113 were in their first year of university, 163 attended two years, 24 were in their third year, 25 were in their fourth year, and 31 were in their fifth year. Additionally, 14 participants had been attending university for more than five years. All participants were informed about the study and provided informed consent, and the collected data were handled anonymously.

2.3. Questionnaires

2.3.1. Parental Bonding Instrument (PBI)

The PBI (Parker et al., 1979) provides a retrospective measure of a person's perception of the mother's and father's behaviors before the age of sixteen. For the current study, we used the Italian version of the questionnaire (Scinto et al., 1999). The PBI includes 50 items and is divided into two sections of 25 items, one for each parent. All items are on a 4-point Likert scale from 0 (i.e., "Very unlike") to 3 (i.e., "Very like"). For each parent, the PBI assesses parental behaviors on two main dimensions: "Care" and "Overprotection". The dimension of Care for one parent is obtained with 13 items that refer to affection, emotional warmth, empathy, and closeness (Hoenicka et al., 2022; Neoh et al., 2021; Rubin et al., 2002). One example of an item belonging to the Care dimension is "My mother/father appeared to understand my problems and worries". The dimension of Overprotection for one parent is obtained with the remaining 12 items. Overprotection measures the degree of parental intrusion, stimulation of a child's dependence, and control of a child's behaviors even in unnecessary situations (Hoenicka et al., 2022; Neoh et al., 2021; Rubin et al., 2002). An example of an item belonging to the Overprotection scale is "My mother/father tried to make me feel dependent on her/him". In the current study, the instrument showed good internal consistency (Cronbach's α Care: 0.894 mother and 0.910 father; Cronbach's α Overprotection: 0.849 mother and 0.829 father; McDonald's ω Care: 0.896 mother and 0.905 father; McDonald's ω Overprotection: 0.876 mother and 0.858 father).

The Care and Overprotection scales for each parent were combined in an orthogonal manner to identify participants' experienced parenting styles. The four available parenting styles are *optimal parenting* (high care and low overprotection), *neglectful parenting* (low care and low overprotection), *affectionate control* (high care and high overprotection), and *affectionless control* (low care and high overprotection). In line with the existing literature, maternal care values lower than 27 and paternal care values lower than 24 are considered "low". Similarly, maternal overprotection values lower than 13.5 and paternal overprotection values lower than 12.5 are considered "low" (Averina et al., 2021; Parker et al., 1979).

2.3.2. Penn State Worry Questionnaire (PSWQ)

The PSWQ is a self-report instrument designed to measure the trait of worry, a core feature of most anxiety disorders (e.g., generalized anxiety disorder) (Startup & Erickson, 2006). The PSWQ was created by Meyer et al. (1990), while the Italian version that we used in the current study was developed by Meloni and Gana (2001). The PSWQ consists of 16 items on a 5-point Likert scale with values from 1 ("not at all typical of me") to 5 ("very typical of me"). The PSWQ items explore the excessiveness, duration, and uncontrollability of worry and associated stress (Stoeber & Bittencourt, 1998). An example of an item is "When I am under pressure I worry a lot". The total PSWQ score is computed by summing the scores of all questionnaire items. In the current sample, the questionnaire showed good internal consistency (Cronbach's $\alpha = 0.924$; McDonald's $\omega = 0.931$).

2.3.3. Beck Anxiety Inventory (BAI)

The BAI is a self-report measure of anxiety. The original version of the questionnaire was developed by Beck et al. (1988), while, in the current study, we used the Italian validation developed by Sica and Ghisi (2007). The scale consists of 21 items, each of which describes a common symptom of anxiety (e.g., "Feelings of choking", "Heart pounding or racing"). For each item, the participant needs to rate how much they have been bothered by the symptom over the past week on a 4-point Likert scale from 0 ("Not at all") to 3 ("Severely — I could barely stand it"). The total BAI score is computed by summing the scores of all items. In the current sample, the BAI showed good internal consistency (Cronbach's $\alpha = 0.915$; McDonald's $\omega = 0.919$).

2.4. Statistical analyses

Descriptive analyses were initially conducted on the study's variables. For all numerical variables, we checked for the presence of outliers, defined as any data point that is 1.5 times the interquartile range below the first quartile or 1.5 times the interquartile range above the third quartile. Subsequently, we calculated the mean, standard deviation, minimum, first quartile, median, third quartile, and maximum values based on the collected data. Regarding categorical variables, such as gender and parenting styles, we presented both the absolute and relative frequencies.

For the subsequent inferential analyses, we ensured that the collected data satisfied the assumptions of parametric tests by conducting Shapiro-Wilk and Bartlett's tests. The Shapiro-Wilk test was utilized to assess the normality of the data, while Bartlett's test was employed to examine the homoscedasticity of variances between groups.

Initial inferential analyses were undertaken to explore the relationships between demographic variables, worry, and anxiety. Initially, we compared worry and anxiety scores across gender groups and across years of university groups. The consideration of gender groups was restricted to males and females, as the non-binary group consisted of only 6 data points. Scores on the PSWQ and BAI for males and females were compared using a *t*-test for independent samples, or, in cases where the assumptions were not met, a Mann-Whitney *U* test. Subsequently, a Kruskal-Wallis test was used to check differences in worry and anxiety across year of university groups. Subsequently, we assessed the correlations between age, worry, and anxiety scores by computing two Pearson's correlation tests: one between age and PSWQ scores and the other on age and BAI scores. When the assumptions of Pearson's correlation test were not met, the non-parametric counterpart, Spearman's correlation test, was employed for the analyses.

A series of one-way analyses of variance (ANOVA) or its non-parametric counterpart, the Kruskal-Wallis test, were conducted to compare the scores across parenting style groups. Specifically, four

ANOVAs were conducted: one ANOVA to test differences in PSWQ scores across maternal styles; one to test differences in PSWQ scores across paternal styles; one to test differences in BAI scores across maternal styles; one to test differences in BAI scores across paternal styles. When the results of one ANOVA were statistically significant, differences across groups were investigated in a pairwise fashion using Tukey's test (for ANOVA) or Dunn's test (for the Kruskal-Wallis test). For the *post-hoc* comparisons, the alpha level was adjusted with Bonferroni's correction to reduce the risk of false positive results due to multiple tests.

In the concluding analysis, we conducted two stepwise linear regressions employing a backward elimination method. The aim was to investigate the predictive capacity of demographic variables and PBI scores on the Care and Overprotection dimensions in relation to worry and anxiety. Regression models allow the use of PBI subscales as a *continuum*, moving beyond categorical parenting style groups obtained through PBI cut-off scores. Two distinct models were developed: one aimed at predicting PSWQ scores, and the other focused on predicting BAI scores. To ensure an adequate number of data points for each gender class, these models were applied to data from both male and female participants. Furthermore, separate regression models were generated by exclusively considering data from either male or female participants individually. Before conducting the regression analyses, PBI variables were mean-centered. Subsequently, principal component analysis (PCA) was used to address multicollinearity among the independent variables. Specifically, one PCA was conducted on the scores of maternal care and paternal care to extract the component of *parental care*, and another PCA was conducted on maternal and paternal overprotection scores to extract the *parental overprotection* component.

3. Results

3.1. Descriptive analyses

An initial inspection of the available data suggested the presence of three outliers for maternal care, zero outliers for paternal care, one outlier for maternal overprotection, six outliers for paternal overprotection, zero outliers for worry scores, and nine outliers for anxiety symptoms. Moreover, no missing value was identified in the dataset.

Descriptive analyses were performed on the numerical variables of the study. On average, participants reported average scores on maternal ($M = 26.88$, $SD = 7.13$) and paternal care ($M = 23.26$, $SD = 8.07$). Moreover, they tend to report high scores of maternal overprotection ($M = 14.48$, $SD = 7.23$) as well as low scores of paternal overprotection ($M = 11.62$, $SD = 6.31$). In terms of worry and anxiety, participants tended to obtain an average score of 52.21 ($SD = 12.86$) at the PSWQ and an average score of 17.26 ($SD = 12.01$) at the BAI, suggesting moderate anxiety symptoms. Table 1 reports the results of the performed descriptive analyses.

Regarding parenting styles, 139 participants (37.57 %) reported experiencing *optimal parenting*, 38 (10.27 %) reported *neglectful parenting*, 82 (22.16 %) reported *affectionate control*, and 111 (30.00 %) reported *affectionless control* from the mother's side. Similarly, 144

participants (38.92 %) experienced *optimal parenting*, 59 (15.95 %) experienced *affectionate control*, 80 (21.62 %) experienced *neglectful parenting*, and 87 (23.51 %) experienced *affectionless control* from the father's side.

3.2. Demographics, worry, and anxiety

Scores for the trait of worry, as assessed with the PSWQ, exhibited a normal distribution in males ($W = 0.983$, $p = 0.313$) but not in females ($W = 0.986$, $p = 0.007$). Additionally, Bartlett's test results indicated that PSWQ scores across genders had equal variance ($B = 0.513$, $p = 0.474$). Since the assumption of normality was not met, a Mann-Whitney U test was employed to compare the PSWQ scores between males and females. The results suggested a significant difference in PSWQ scores between males ($M = 47.65$, $SD = 13.31$) and females ($M = 53.45$, $SD = 12.51$, $U = 8715.50$; $z = -3.699$, $p < 0.001$, $r = -0.194$; see Fig. 1A). This result suggests that females tended to report significantly higher levels of the trait of worry as compared to males, with a small effect size.

Anxiety scores, as assessed with the BAI, were not normally distributed in males ($W = 0.901$, $p < 0.001$) and females ($W = 0.937$, $p < 0.001$). Bartlett's test results suggested that males and females had anxiety scores with equal variance ($B = 1.391$, $p = 0.238$). Since the assumption of normality was not met, a Mann-Whitney U test was employed to compare the BAI scores between males and females. The results suggested a significant difference in BAI scores between males ($M = 14.41$, $SD = 11.00$) and females ($M = 18.13$, $SD = 12.23$; $U = 9556.50$, $z = -2.709$, $p = 0.007$, $r = -0.142$; see Fig. 1B). This result suggests that females tended to report significantly higher levels of anxiety symptoms than males with a small effect size.

The assumption about the normality of data was not always satisfied for scores of worry across years of university groups (first year: $W = 0.974$, $p = 0.028$; second year: $W = 0.988$, $p = 0.181$; third year: $W = 0.969$, $p = 0.635$; fourth year: $W = 0.964$, $p = 0.506$; fifth year: $W = 0.958$, $p = 0.258$; more than five years of university: $W = 0.969$, $p = 0.862$), although the groups have equal variance ($B = 5.754$, $p = 0.331$). No statistical difference was observed in worry scores across groups ($H = 3.219$, $p = 0.666$). Similarly, for anxiety scores across university year groups, the assumption of normality of data was not satisfied (first year: $W = 0.937$, $p < 0.001$; second year: $W = 0.915$, $p < 0.001$; third year: $W = 0.976$, $p = 0.821$; fourth year: $W = 0.862$, $p = 0.003$; fifth year: $W = 0.906$, $p = 0.010$; more than five years of university: $W = 0.868$, $p = 0.039$), despite groups having equal variance ($B = 8.910$, $p = 0.113$). No significant difference in terms of anxiety symptoms was observed across groups ($H = 1.571$, $p = 0.905$).

Results from the Shapiro-Wilk test suggested that participants' age, PSWQ, and BAI scores were not normally distributed in the sample (age: $W = 0.887$, $p < 0.001$; PSWQ: $W = 0.988$, $p = 0.003$; BAI: $W = 0.931$, $p < 0.001$). For this reason, Spearman's correlation tests were conducted (see Fig. 2). No significant correlation emerged between age and the worry trait ($r(368) = -0.007$, $p = 0.894$), as assessed with the PSWQ, nor between age and anxiety ($r(368) = -0.052$, $p = 0.319$), as assessed with the BAI.

Table 1
Descriptive statistics for the numerical variables of the study. The mean, standard deviation, minimum (Min), first quartile, median, third quartile, and maximum (Max) values are reported. The numerical variables are participants' age, scores on the Parental Bonding Instrument (PBI)'s Care scale for mothers and fathers, scores on the PBI's Overprotection scale for mothers and fathers, worry scores on the Penn State Worry Questionnaire (PSWQ), and anxiety scores on the Beck Anxiety Inventory (BAI).

	Mean	Standard deviation	Min	1st quartile	Median	3rd quartile	Max
Age	20.84	1.81	18.00	20.00	20.00	22.00	28.00
PBI Care (Mother)	26.88	7.13	1.00	22.00	28.00	32.00	36.00
PBI Care (Father)	23.26	8.07	0.00	17.00	24.00	29.00	36.00
PBI Overprotection (Mother)	14.48	7.23	0.00	9.00	14.00	19.00	36.00
PBI Overprotection (Father)	11.62	6.31	0.00	7.00	11.00	15.00	34.00
PSWQ	52.21	12.86	19.00	43.00	53.00	62.00	79.00
BAI	17.26	12.01	0.00	8.00	14.00	24.00	57.00
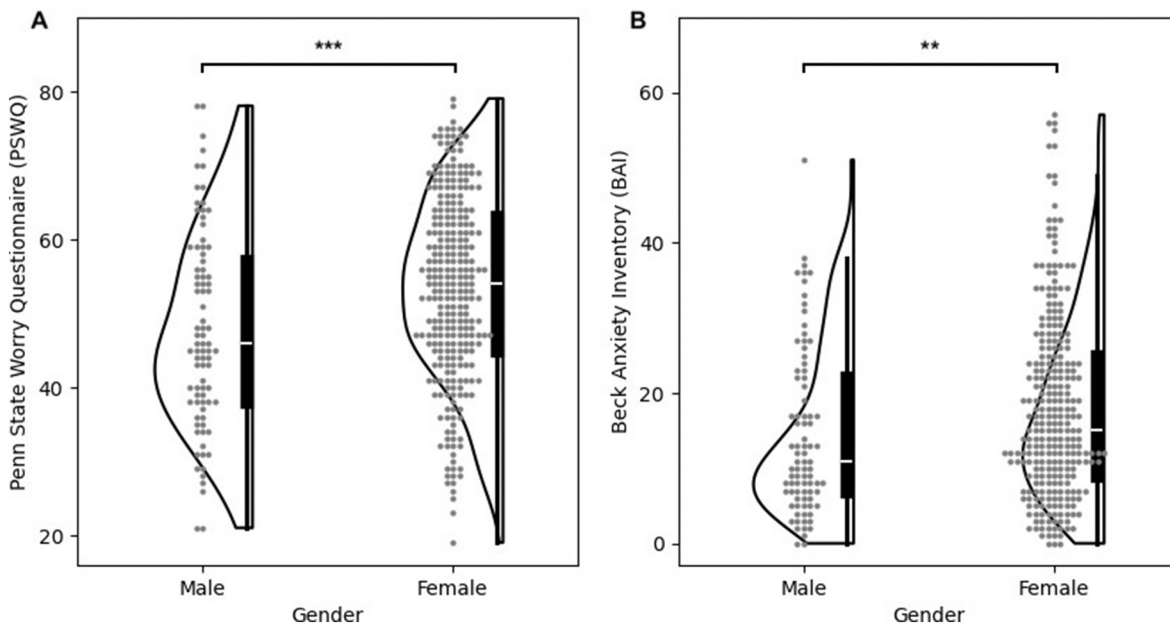
Fig. 1. Worry and anxiety across genders. **A)** Distribution of scores on the Penn State Worry Questionnaire (PSWQ) in males and females. Females tended to report higher scores of worry as compared to males. **B)** Distribution of scores on the Beck Anxiety Inventory (BAI) in males and females. Females tended to report higher anxiety than males. (** $p < 0.01$; *** $p < 0.001$).
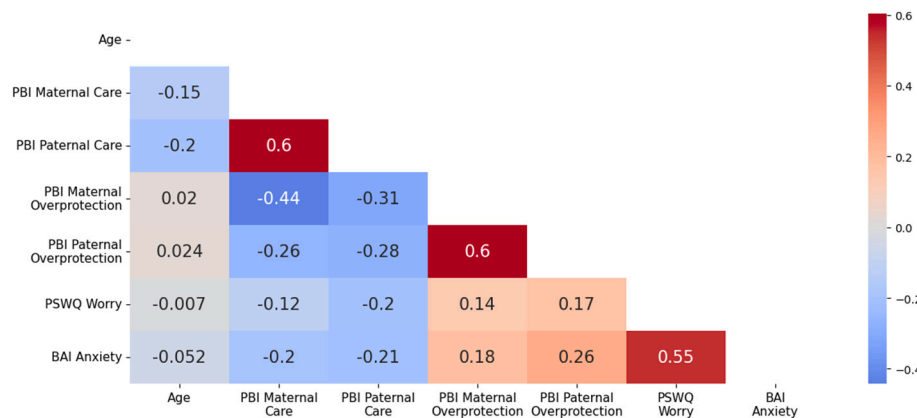
Fig. 2. Heatmap of the Spearman's correlation matrix computed on the numerical variables of the study. The included variables are participants' age, scores on the Parental Bonding Instrument (PBI)'s Care scale for mothers and for fathers, scores on the PBI's Overprotection scale for mothers and for fathers, scores on the Penn State Worry Questionnaire (PSWQ), and scores on the Beck Anxiety Inventory (BAI). Correlation values are color-coded, with negative correlation values in blue and positive values in red. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)
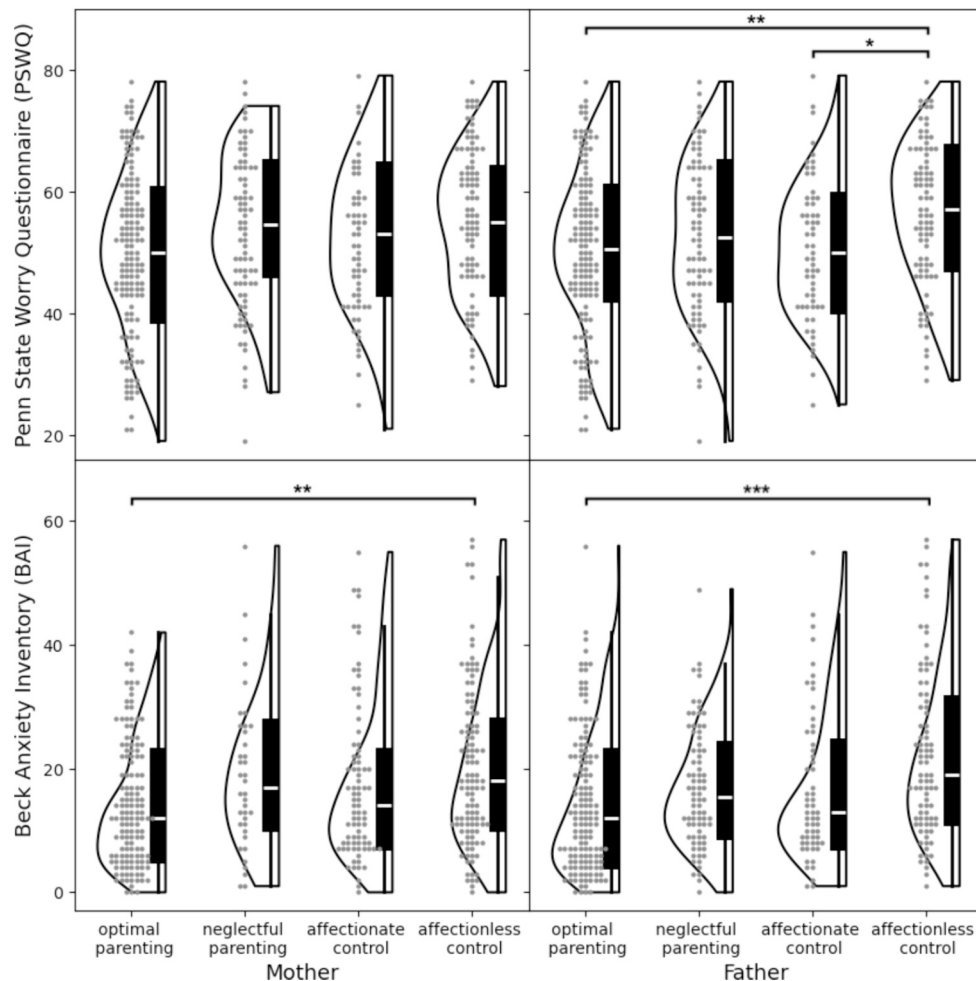
3.3. Parenting styles, worry, and anxiety

The scores for the trait of worry, as assessed with the PSWQ, were found to be normally distributed across maternal styles groups (*optimal parenting*: $W = 0.987$, $p = 0.194$; *neglectful parenting*: $W = 0.961$, $p = 0.210$; *affectionate control*: $W = 0.989$, $p = 0.711$; *affectionless control*: $W = 0.980$, $p = 0.088$) and to have equal variance ($B = 1.873$, $p = 0.599$). For this reason, a one-way ANOVA was conducted. The ANOVA resulted statistically significant ($F(3, 366) = 2.889$, $p = 0.035$, $\eta^2 = 0.023$), suggesting that at least two groups were significantly different in their levels of worry. *Post-hoc* Tukey's tests were conducted to further examine pairwise differences in PSWQ scores among maternal style groups. After correcting for multiple tests, the results revealed no significant difference in the trait of worry across maternal styles groups (see Fig. 3**A**, Table 2, and Table 3).

The scores for the trait of worry, as assessed with the PSWQ, were found to be normally distributed across three paternal styles groups

(*neglectful parenting*: $W = 0.985$, $p = 0.450$; *affectionate control*: $W = 0.989$, $p = 0.889$; *affectionless control*: $W = 0.974$, $p = 0.079$), but not in the group who experienced *optimal parenting* ($W = 0.981$, $p = 0.040$). Scores from all groups had equal variance ($B = 2.758$, $p = 0.430$). For this reason, a Kruskal-Wallis test was conducted. The Kruskal-Wallis test resulted statistically significant ($H = 13.718$, $p = 0.003$), suggesting that at least two groups were significantly different in their PSWQ scores. *Post-hoc* Dunn's tests were conducted to further examine pairwise differences in PSWQ scores among paternal style groups following a significant Kruskal-Wallis test. The results revealed a significant difference in the trait of worry between participants who experienced *optimal parenting* and the ones who experienced *affectionless control* (adjusted $p = 0.003$) and between the ones who experienced *affectionate control* and *affectionless control* from their fathers (adjusted $p = 0.028$). No significant difference emerged when comparing the PSWQ scores among the other groups (see Fig. 3**B**, Tables 2 and 3).

Anxiety scores, as assessed with the BAI, were found to be non-

Fig. 3. Scores of Penn State Worry Questionnaire (PSWQ) and Beck Anxiety Inventory (BAI) across parenting style groups, as measured with the Parental Bonding Instrument (PBI). **A)** Distribution of the trait of worry, as assessed with the PSWQ, across maternal styles. **B)** Distribution of the trait of worry, as assessed with the PSWQ, across paternal styles. **C)** Distribution of anxiety, as assessed with the BAI, across maternal styles. **D)** Distribution of anxiety, as assessed with the BAI, across paternal styles. (* adjusted $p < 0.05$; ** adjusted $p < 0.01$; *** adjusted $p < 0.001$).

normally distributed across three maternal styles groups (*optimal parenting*: $W = 0.492$, $p < 0.001$; *neglectful parenting*: $W = 0.946$, $p = 0.067$; *affectionate control*: $W = 0.890$, $p < 0.001$; *affectionless control*: $W = 0.942$, $p < 0.001$), and to have unequal variance ($B = 9.012$, $p = 0.029$). For this reason, a Kruskal-Wallis test was conducted. The Kruskal-Wallis test resulted statistically significant ($H = 13.354$, $p = 0.004$), suggesting that at least two groups were significantly different in their anxiety scores. *Post-hoc* Dunn's tests were conducted to further examine pairwise differences in BAI scores among maternal style groups following a significant Kruskal-Wallis test. The results revealed a significant difference in anxiety scores between participants who experienced *optimal parenting* and the ones who experienced *affectionless control* from their mothers (adjusted $p = 0.003$). No significant difference emerged when comparing the BAI scores among the other groups (see Fig. 3**C**, Tables 2 and 3).

Anxiety scores, as assessed with the BAI, were found to be non-normally distributed across paternal styles groups (*optimal parenting*: $W = 0.920$, $p < 0.001$; *neglectful parenting*: $W = 0.962$, $p = 0.0180$; *affectionate control*: $W = 0.892$, $p < 0.001$; *affectionless control*: $W = 0.936$, $p < 0.001$) and to have unequal variance ($B = 9.998$, $p = 0.019$). For this reason, a Kruskal-Wallis test was conducted. The Kruskal-Wallis test resulted statistically significant ($H = 22.712$, $p < 0.001$), suggesting that at least two groups were significantly different in their anxiety scores. *Post-hoc* Dunn's tests were conducted to further examine pairwise differences in BAI scores among paternal style groups following a

significant Kruskal-Wallis test. The results revealed a significant difference in anxiety scores between participants who experienced *optimal parenting* and the ones who experienced *affectionless control* from their mothers (adjusted $p < 0.001$). No significant difference emerged when comparing the BAI scores among the other groups (see Fig. 3**D**, Tables 2 and 3).

3.4. Predictive model of the trait of worry

A stepwise linear regression, using a backward elimination method, was conducted to examine the predictors of the trait of worry, as measured with the PSWQ. The analysis revealed a significant model fit ($F(360, 3) = 12.550$, $p < 0.001$). The final model included participants' gender (Male; $\beta = -5.853$, Standard Error (*SE*) $= 1.539$, $p < 0.001$), parental care ($\beta = -1.587$, *SE* $= 0.573$, $p = 0.006$), and parental overprotection ($\beta = 1.192$, *SE* $= 0.574$, $p = 0.038$) as predictor variables. During the backward elimination process, participants' age and the interaction between parental care and parental overprotection were removed as predictors from the model. The model accounted for $R^2_{adj} = 7.97\%$ of the variance in the dependent variable.

Other two stepwise linear regressions with a backward elimination method were performed to predict the trait of worry. The first one was performed in the subset of male participants. The analysis revealed a significant model fit ($F(83, 1) = 9.985$, $p = 0.002$, $R^2_{adj} = 9.66\%$). The

Table 2

Post-hoc comparisons between worry and anxiety scores among parenting styles. Significant adjusted *p*-values are reported in bold format.

Group 1	Group 2	Adjusted *p*-value
Maternal Styles and Worry		
Optimal parenting	Neglectful parenting	0.165
Optimal parenting	Affectionate control	0.342
Optimal parenting	Affectionless control	0.050
Neglectful parenting	Affectionate control	0.877
Neglectful parenting	Affectionless control	0.993
Affectionate control	Affectionless control	0.910
Paternal Styles and Worry		
Optimal parenting	Neglectful parenting	1.000
Optimal parenting	Affectionate control	1.000
Optimal parenting	Affectionless control	**0.003**
Neglectful parenting	Affectionate control	1.000
Neglectful parenting	Affectionless control	0.315
Affectionate control	Affectionless control	**0.028**
Maternal Styles and Anxiety		
Optimal parenting	Neglectful parenting	0.197
Optimal parenting	Affectionate control	0.798
Optimal parenting	Affectionless control	**0.003**
Neglectful parenting	Affectionate control	1.000
Neglectful parenting	Affectionless control	1.000
Affectionate control	Affectionless control	0.652
Paternal Styles and Anxiety		
Optimal parenting	Neglectful parenting	0.150
Optimal parenting	Affectionate control	1.000
Optimal parenting	Affectionless control	**<0.001**
Neglectful parenting	Affectionate control	1.000
Neglectful parenting	Affectionless control	0.207
Affectionate control	Affectionless control	0.054

final model included only participants' score of parental care ($\beta = -3.642$, $SE = 0.153$, $p = 0.002$) as the predictor variable. During the backward elimination process, participants' age, scores of parental overprotection, and the interaction between parental care and parental overprotection were removed as predictors from the model. The second regression was performed on data from female participants. The model

resulted statistically significant ($F(276, 2) = 8.264$, $p < 0.001$, $R^2_{adj} = 4.53\%$). The final model included participants' scores of parental care ($\beta = -0.920$, $SE = 0.643$, $p = 0.153$) and parental overprotection ($\beta = 1.677$, $SE = 0.629$, $p = 0.008$) as predictor variables. During the backward elimination process, participants' age and the interaction between parental care and parental overprotection were removed as predictors from the model.

Differences in the predictive capacity of parental care and parental overprotection between males and females do not appear to be caused by different variability of these variables between genders (see Fig. 4).

3.5. Predictive model of anxiety scores

A stepwise linear regression, using a backward elimination method, was conducted to examine the predictors of anxiety, as measured with the BAI. The analysis revealed a significant model fit ($F(360, 3) = 13.480$, $p < 0.001$, $R^2_{adj} = 9.35\%$). The final model included participants' gender (Male; $\beta = -3.716$, $SE = 1.424$, $p = 0.009$), parental care ($\beta = -1.662$, $SE = 0.531$, $p = 0.002$), parental overprotection ($\beta = 1.672$, $SE = 0.531$, $p = 0.002$) as predictor variables. During the backward elimination process, participants' age and the interaction between parental care and parental overprotection were removed as predictors from the model.

Other two stepwise linear regressions with a backward elimination method were performed to predict anxiety. The first one was performed in the subset of male participants. The analysis revealed a significant model fit ($F(83, 1) = 13.75$, $p < 0.001$, $R^2_{adj} = 13.17\%$). The final model included only participants' scores on parental care ($\beta = -3.462$, $SE = 0.934$, $p < 0.001$) as the predictor variable. During the backward elimination process, participants' age, scores of parental overprotection, and the interaction between parental care and parental overprotection were removed as predictors from the model. The second regression was performed on data from female participants. The model resulted statistically significant ($F(275, 3) = 12.660$, $p < 0.001$, $R^2_{adj} = 8.94\%$). The final model included participants' age ($\beta = -0.807$, $SE = 0.412$, $p = 0.051$), parental care ($\beta = -1.249$, $SE = 0.618$, $p = 0.044$), and parental overprotection ($\beta = 2.204$, $SE = 0.601$, $p < 0.001$) as predictor variables. During the backward elimination process, the interaction between

Table 3

Descriptive statistics for worry scores on the Penn State Worry Questionnaire (PSWQ) and anxiety scores on the Beck Anxiety Inventory (BAI) across parenting styles. The mean, standard deviation, minimum (Min), first quartile, median, third quartile, and maximum (Max) values are reported.

| Group	Mean	Standard deviation	Min	1st quartile	Median	3rd quartile	Max
Maternal Styles and Worry							
Optimal parenting	49.79	13.40	19.00	39.50	50.00	59.50	78.00
Neglectful parenting	54.63	12.25	27.00	47.00	54.50	64.00	74.00
Affectionate control	52.76	13.02	21.00	44.00	53.00	63.50	79.00
Affectionless control	53.99	11.90	28.00	44.00	55.00	63.00	78.00
Paternal Styles and Worry							
Optimal parenting	50.10	13.48	21.00	43.00	50.50	60.00	78.00
Neglectful parenting	52.60	12.77	19.00	43.00	52.50	64.00	78.00
Affectionate control	50.59	11.56	25.00	41.00	50.00	58.50	79.00
Affectionless control	56.43	11.86	29.00	48.00	57.00	66.50	78.00
Maternal Styles and Anxiety							
Optimal parenting	14.42	10.09	0.00	6.00	12.00	22.00	42.00
Neglectful parenting	19.08	12.42	1.00	11.00	17.00	26.75	56.00
Affectionate control	17.50	12.70	0.00	8.00	14.00	22.00	55.00
Affectionless control	20.01	12.89	0.00	11.00	18.00	27.00	57.00
Paternal Styles and Anxiety							
Optimal parenting	14.47	11.17	0.00	5.00	12.00	22.00	56.00
Neglectful parenting	17.04	9.72	0.00	9.75	15.50	23.35	49.00
Affectionate control	16.86	12.15	1.00	8.00	13.00	23.50	55.00
Affectionless control	22.34	13.63	1.00	12.00	19.00	30.50	57.00
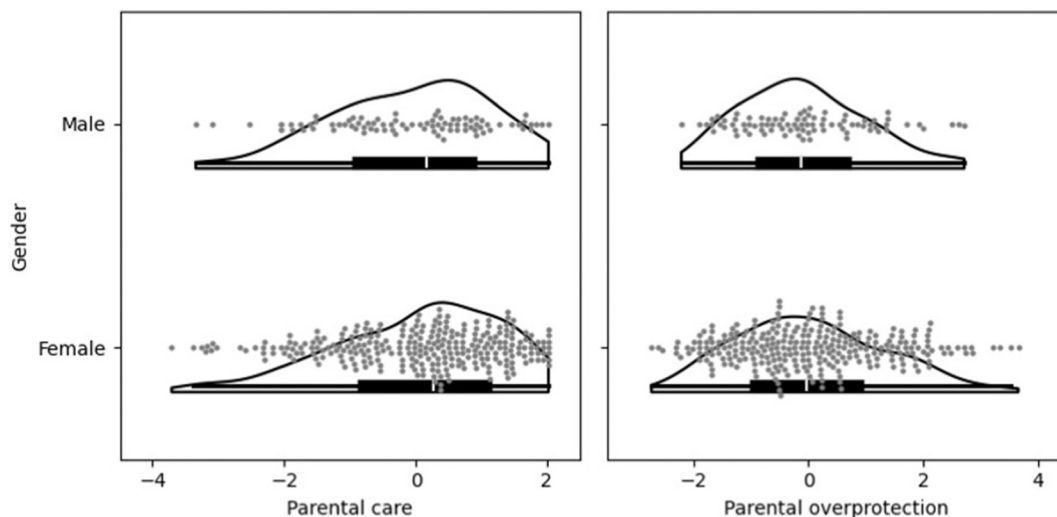
Fig. 4. Parental care and parental overprotection scores across genders.

parental care and parental overprotection was removed as a predictor from the model.

As for the previous section, differences in the predictive capacity of parental care and parental overprotection between males and females do not appear to be caused by different variability of these variables between genders (see Fig. 4).

4. Discussion

The prevalence of anxiety is on the rise and emerging adult students appear to be a particularly at-risk population. Extensive literature has shown that early parental bonding predicts anxiety disorders. However, most studies have focused on discrete clinical groups and have found different patterns of parental bonding across anxiety disorders. Therefore, the link between parental bonding and subclinical levels of shared symptoms across anxiety disorders has not been extensively explored, especially in emerging adult students. Using a dimensional approach, this research aimed to investigate the relationship between demographics (gender and age) and core features of anxiety disorders in a sample of emerging adults who are university students in Italy. Additionally, the study investigated how, in this sample, early parental bonding experiences can predict features of anxiety disorders later in life.

In the study, descriptive statistics revealed that most participants reported experiences of *optimal parenting*, both in regards to the mother and the father. This was followed, in order, by *affectionless control*, *affectionate control*, and *neglectful parenting*. The average scores for the care dimension were higher than those reported by Hoenicka et al. (2022), but consistent with Romeo et al. (2020). Conversely, the overprotection scores aligned with previous studies conducted on Italian samples (e.g., Hoenicka et al. (2022); Romeo et al. (2020)). However, differences in the PBI scores tend to be observed across cultures (e.g., Hoenicka et al. (2022)). For instance, the prevalence of parenting styles in the current study differed from those reported for young adults from Indonesia by Averina et al. (2021). Culture may shape parental bonding by providing a set of behaviors and strategies deemed acceptable within a given social group. For example, Italian participants tend to report lower scores of maternal overprotection compared to participants from Eastern cultures, such as Japan (Hoenicka et al., 2022). This suggests a higher tolerance for maternal overprotection among Italian participants compared to other populations. Consequently, using cut-off scores that were not validated in the specific socio-cultural context of the study may be problematic. To address this issue, the current study supported the analysis based on cut-off scores for parental care and overprotection

scales with a regression analysis that considers the entire *continuum* of parental care and overprotection.

The results of this study demonstrate that both the trait of worry and anxiety symptoms are more prevalent in females compared to male university students. This pattern is widely supported in the existing literature. Across all age groups, females are more likely to screen positive for anxiety (Tan et al., 2023). In the scientific literature, the higher prevalence of anxiety in females is attributed to a combination of genetic, hormonal, and psycho-social factors (e.g., Bandelow and Michaelis (2022); Bahrami and Yousefi (2011)). However, some studies argue for the possibility that males may under-report their anxiety-related features due to various barriers to help-seeking. These barriers include a fear of mental disorders, fear of being perceived as weak, fear of humiliation and shame, and outright denial (Lynch et al., 2018; Smith et al., 2018; Tan et al., 2023).

Unexpectedly, no linear relationship between age and anxiety features emerged. Nevertheless, participants' age, along with gender and parental bonding, was incorporated into the predictive model of anxiety symptoms. The predictive model conducted on data from female participants indicated that being younger was associated with higher anxiety symptoms. However, although age was included as predictor in the model, it failed to reach statistical significance. Qualitatively, this negative trend between age and anxiety symptoms could be explained by the fact that younger university students are in the early stages of transitioning from adolescence to adulthood. This initial period may be marked by numerous challenges, including adapting to the new university environment and facing academic pressures. Conversely, older university students may perceive their phase within the emerging adulthood period as more stable and may have already successfully navigated past life and academic challenges.

The hypothesis that worry and anxiety symptoms were predicted by patterns of parental bonding is supported by the findings of this study. Participants who experienced optimal parenting (high care and low overprotection) reported lower anxiety-related features than those experiencing affectionless control (low care and high overprotection). This finding aligns with existing literature, indicating that suboptimal parental practices are risk factors for negative developmental outcomes and increased psychopathology risk later in life (Kidd et al., 2022). Overall, studies in the literature frequently associate low parental care and high overprotection with anxiety disorders (Kidd et al., 2022; Leon & Leon, 1990; Parker, 1979). For example, Fentz et al. (2011) observed that university students with anxiety disorders reported higher maternal and paternal care and higher paternal overprotection compared to the control group.

Further analyses were conducted to move beyond categorical groups of parenting styles and utilize the entire *continuum* of care and overprotection scores. Given the high correlation between maternal and paternal care and overprotection scores, we computed two principal components for use in regression analyses: *parental care* and *parental overprotection*. Overall, lower parental care and higher parental overprotection predicted higher levels of worry and anxiety symptoms across the sample. However, different predictors emerged when the sample was divided by gender. Specifically, lower levels of parental care were a significant and stable predictor of core anxiety features among males, while higher levels of parental overprotection were a significant and stable predictor of core anxiety features among females. These differences do not seem to be caused by variations in the reported levels of parental care and overprotection between males and females, as participants of both genders reported comparable levels of parental care and overprotection. Therefore, at least in the Italian context, there appears to be a different susceptibility to variations in the dimensions of care and overprotection across genders, influencing the risk of developing anxiety symptoms. On the one hand, Italian males seem to be more sensitive to variations in affection, emotional warmth, and empathy received from parents. On the other hand, Italian females seem to be more sensitive to instances of parental intrusion and control, as observed by Otani et al. (2012, 2013) among Japanese participants. These results might stem from biological differences between genders, but they could also reflect the influence of cultural norms and social expectations. In many cultures, males tend to be socialized to be independent and to show less emotionality (Rice et al., 2021), while females might be socialized to be more dependent and sensitive to parental control (e.g., Aubé et al. (2000); Smetana and Daddis (2002)). These cultural norms can, in turn, lead to different sensitivities with regards to parental practices.

4.1. Limitations of the study

The study has shed light on the relationship between demographic variables, early parental bonding, and key features of anxiety disorders. However, it is crucial to acknowledge certain limitations of the study design. Firstly, the investigation relies solely on cross-sectional questionnaire data, precluding any causal and longitudinal interpretation of the role of parental practices in the development of anxiety-related features. Specifically, the PBI only permits the measurement of perceived patterns of parental practices, introducing the potential for states of idealization or anger toward one's parents to influence such perceptions. Furthermore, the current study exclusively explores the association between demographics, parental practices, and anxiety-related features. The development of anxiety disorders and related features is not solely dependent on these factors. Indeed, there may be additional risk factors that contribute to susceptibility to anxiety disorders, factors that were not explored in the current investigation. For example, we did not investigate experiences of single-parent care, such as participants who lost a parent before age 16 or those from divorced families. Additionally, information regarding participants' family structures — e.g., whether they had heterosexual, same-sex, biological, or adoptive parents – was not provided, potentially impacting the generalizability of our findings. Furthermore, the questionnaire did not address instances of severe parental neglect or abuse, such as adverse childhood experiences.

5. Conclusion

The present study revealed a higher prevalence of both the trait of worry and anxiety symptoms among female university students. Additionally, the study highlighted the influential role of suboptimal patterns of parenting styles, specifically low care and high overprotection, in predicting worry and anxiety symptoms in university students. The predictive relationship between parental care and parental overprotection exhibited a gender-specific effect: lower care was a more stable predictor of anxiety features in males, while higher overprotection was more significant for female participants. For a more comprehensive understanding of the risk factors contributing to the susceptibility of emerging adults to anxiety disorders, future research endeavors could benefit from integrating self-report data with observational and interview methods. This multifaceted approach would provide a holistic perspective on participants' experienced parenting styles. Furthermore, it is suggested that future investigations explore additional factors such as cultural differences in parental practices, adverse childhood experiences, family structure, and comorbid psychiatric symptoms as potential modulating variables. This broader scope of investigation would contribute to a nuanced perspective on the complex interplay of variables impacting anxiety symptoms in emerging adult students.

CRediT authorship contribution statement

Alessandro Carollo: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Sonia De Marzo:** Writing – review & editing, Writing – original draft, Conceptualization. **Gianluca Esposito:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

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