



# Parental eco-stress and children's internalizing and externalizing problems: Differential pathways via parental burnout symptoms

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## Abstract

Parents increasingly navigate climate-related disruptions that may tax caregiving and shape children's adjustment. This study used a Structural Equation Modeling approach to examine whether parental climate change-related stress (namely, eco-stress) relates to children's internalizing and externalizing problems via symptom-specific parental burnout in a community sample of 1,200 cisgender heterosexual parents ( $M=45.60$ ,  $SD=9.37$ ; 70.00% mothers) residing in Italy with at least one biological child ( $M=12.00$ ,  $SD=5.49$ ; 52.08% assigned females at birth). Parent age, child age, and child gender were covaried in both models, and the number of children was covaried in the externalizing problems model only. Eco-stress showed a direct association with children's internalizing problems, with no significant indirect associations via parental burnout symptoms. In contrast, eco-stress related to children's externalizing problems only indirectly via parental exhaustion and saturation. These findings suggest an affective-climate route for child internalizing problems and a resource-depletion route for child externalizing problems, clarifying which parental burnout symptoms carry risk. Findings may inform differentiated, family-focused supports that mitigate parental eco-stress, stabilizing the emotional climate and rebuilding parental resources, thereby enhancing behavioral consistency and resilience in caregiving.

**Keywords** Climate change · Parental eco-stress · Parental burnout · Internalizing problems · Externalizing problems

## Introduction

Families increasingly navigate everyday life in the context of climate change (Cuartas et al., 2026). Beyond acute disasters, many parents contend with recurrent, lower-intensity disruptions—such as heat advisories, air-quality alerts, and shifts in school or service routines—that accumulate into an ongoing planning and caregiving load (Bechard et al., 2023; Gaziulusoy, 2020; Tracchegiani & Carone, 2026). Developmental and family research increasingly frames climate change as a “threat multiplier” for family systems: acute shocks and chronic hazards can erode caregiver well-being, alter family routines, and shape conditions that

matter for children's socioemotional development (Cuartas et al., 2026). Even in the absence of direct disaster exposure, parents often report persistent worry, role strain, and identity- and values-related tensions when raising children under climate uncertainty (Bechard et al., 2023; Graham et al., 2025). These experiences may reverberate into parenting practices and family emotional climate—central pathways through which contextual stressors influence child adjustment (Ekholm, 2020; Helm et al., 2018; Sanson et al., 2018).

In this study, we focus on parental eco-stress, defined as climate change-related perceived stress that arises when climate-linked demands are experienced as exceeding coping resources in the parenting context. Using a community sample of Italian parents, we tested whether eco-stress is associated with children's internalizing and externalizing problems and whether specific symptoms of parental burnout account for these associations. Italy represents a salient context given the increasing frequency of heatwaves, floods, and droughts (Brunetti et al., 2004) and recent reports positioning the country among those most affected in Europe by climate-related disasters over recent decades (Adil et al., 2025).

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## Parental eco-stress and child adjustment

Climate change can operate as a chronic stressor because its demands are persistent, uncertain, and often uncontrollable (Reser et al., 2011). Parents' climate-related stress appraisals may be shaped by direct exposure to climate-linked events and by indirect exposure via media, anticipatory concerns, and repeated everyday disruptions (Cobham et al., 2016; Thompson, 2021). Eco-stress is related to, but conceptually distinct from, climate anxiety, which emphasizes worry and functional impairment (Clayton & Karazsia, 2020; Hogg et al., 2021). Given the limited availability of validated eco-stress measures (Kırimer-Aydinlı et al., 2025), we operationalized eco-stress via a climate-referenced adaptation of the Perceived Stress Scale (PSS), consistent with stressor-specific PSS adaptations used in other domains (Campo-Arias et al., 2020) and emerging work applying this approach to climate-related stress (Mohamed et al., 2025).

Parents function as core emotional socialization agents and regulators of family affect (Crandon et al., 2022). Climate-related concerns can be transmitted within families, shaping children's environmental attitudes and climate-related emotions (Casaló & Escario, 2016; Meeusen, 2014). Empirically, eco-stress has been associated with poorer caregiver mental health. For example, Helm et al. (2018) linked eco-stress to depressive symptoms among parents, underscoring that climate-linked strain can be psychologically consequential in caregiving contexts.

Within developmental psychopathology, child adjustment is often organized into internalizing (e.g., anxiety, low mood, somatic complaints) and externalizing (e.g., oppositionality, conduct problems, hyperactivity/inattention) spectra (Goodman, 1997; Goodman et al., 2010). Although parental stress broadly relates to both domains (Ribas et al., 2024), internalizing and externalizing difficulties are typically sustained by partially distinct proximal processes, making it important to examine these outcomes separately when studying climate-related stress in families.

To date, studies have not directly tested associations between parental eco-stress and children's behavior problems. Nonetheless, family stress theory predicts that caregiver stress spills over into family emotional climate and parenting processes that shape child adjustment (Cox & Paley, 1997). Recent syntheses of climate distress effects similarly emphasize caregiver distress and family functioning as proximal pathways through which climate change affects children (Cuartas et al., 2026; Ojala, 2023; Proulx et al., 2024). Together, these perspectives suggest that parents' eco-stress appraisals may be consequential for children even when families are not contending with a discrete disaster.

## Links of parental burnout with eco-stress and child adjustment

Parental burnout provides a role-specific framework for understanding how sustained strain undermines parenting. According to the *Balance between Risks and Resources* (BR<sup>2</sup>) model, parental burnout emerges when chronic parenting demands substantially outweigh available personal and contextual resources, resulting in a multidimensional syndrome (Mikolajczak & Roskam, 2018). The Parental Burnout Assessment (PBA) captures four core symptoms: exhaustion in the parental role, contrast in parental self, saturation, and emotional distancing from one's children (Roskam et al., 2018; Mikolajczak & Roskam, 2018).

Parental burnout is empirically distinct from depression and job burnout and has been linked to diminished parenting quality and elevated harshness and neglect, which are robust predictors of child maladjustment (Mikolajczak & Roskam, 2018; Mikolajczak et al., 2018, 2023). Process-oriented work suggests that parental burnout symptoms may unfold in stages: resource loss tends to manifest first as exhaustion and saturation and may later consolidate into contrast and, for some parents, emotional distancing (Roskam et al., 2021). Modeling symptoms separately can therefore sharpen inference about which facets of burnout are most relevant for child outcomes and which parenting-relevant functions may be most affected.

From a pathway perspective, parental burnout may compromise affective availability and behavioral organization in ways that are differentially consequential for internalizing versus externalizing difficulties. Exhaustion may reduce parents' capacity for attuned responding and emotion coaching, undermining children's emotion regulation and increasing vulnerability to anxious or withdrawn responses (Morris et al., 2007). Depletion and irritability associated with exhaustion and saturation may also disrupt monitoring, consistency, and conflict repair—conditions that facilitate coercive cycles and behavioral dysregulation (Patterson, 1982; Pinquart, 2017). More advanced symptoms, such as contrast and emotional distancing, may reflect deeper identity and relational ruptures that could be salient for children's sense of security, but may be less prevalent, or less behaviorally expressed, in community samples.

Emerging evidence supports this outcome-specific framing. In Chilean mothers of preschool-aged children, parental burnout was associated with both internalizing and externalizing problems, with comparatively stronger links to externalizing behavior; positive parenting mediated the burnout-internalizing association and partially mediated the burnout-externalizing association (Woine et al., 2024). In families with adolescents, parental burnout predicted

problem behavior directly and indirectly via impaired family functioning, parental psychological aggression, and reduced adolescent self-control, with supportive coparenting buffering some pathways (Yuan et al., 2022). During early COVID-19, parental burnout partially accounted for associations between parents' perceived psychological impacts and changes in children's stress and positive behaviors (Kerr et al., 2021). Longitudinal evidence also suggests bidirectional dynamics between parental burnout and both internalizing and externalizing difficulties, consistent with transactional amplification processes (Woine et al., 2025). Of further note, a recent systematic review similarly identifies child behavior problems among correlates of parental burnout, reinforcing that child adjustment can be both an outcome and a contributor to parental burnout risk (Ren et al., 2024).

Of note, parental burnout is shaped not only by parenting-specific stressors but also by cumulative strain across life domains (Mikolajczak et al., 2023; Taştekin et al., 2025). Accordingly, scholars have called for parental burnout models that incorporate contextual stressors and specify how they translate into parenting-relevant resource loss (Mikolajczak et al., 2023). Eco-stress is a plausible contributor in this regard: chronic climate-linked demands (e.g., health monitoring during heat or pollution alerts, repeated logistical adjustments, and anticipatory planning) may erode coping resources and increase exhaustion and saturation (Bechard et al., 2023; Gaziulusoy, 2020). As resources decline, parents may become less consistent and more reactive, which is particularly relevant to externalizing difficulties, while shifts in emotional availability and family affective tone may be more closely tied to internalizing difficulties (Morris et al., 2007; Pinquart, 2017).

Qualitative syntheses likewise describe climate change as altering daily caregiving practices and parental meaning-making, underscoring the value of role-specific mechanisms for understanding family adaptation under climate stress (Bechard et al., 2023; Graham et al., 2025; Tracchegiani & Carone, 2026).

Despite this broader literature, empirical work has not yet tested whether parental eco-stress relates to child internalizing and externalizing difficulties through symptom-specific parental burnout pathways. Clarifying this question moves the field beyond documenting that climate change is stressful to specifying whether, and in what form, climate-linked appraisals translate into parenting-relevant resource loss and child adjustment risks. A symptom-level approach is also well-suited to differentiating early resource-depletion facets (exhaustion, saturation) from later identity- and relationship-oriented facets (contrast, emotional distancing) (Roskam et al., 2021).

## The present study

This cross-sectional, questionnaire-based study used structural equation modeling (SEM) to test whether parental eco-stress is associated with children's internalizing and externalizing problems and whether the four PBA symptoms account for these associations. Drawing on family stress theory (Cox & Paley, 1997) and climate distress syntheses (Cuartas et al., 2026; Ojala, 2023; Proulx et al., 2024), we expected higher eco-stress to be associated with higher levels of both outcome domains. Guided by the BR<sup>2</sup> model (Mikolajczak & Roskam, 2018), we also expected eco-stress to be associated with higher levels of each parental burnout symptom, which in turn would relate to more child behavior problems. Because symptom-level pathways remain under-theorized in the climate domain, we treated indirect effects via individual burnout symptoms as exploratory; conceptually, we anticipated that internalizing problems may be more sensitive to shifts in affective climate, whereas externalizing problems may be more sensitive to resource depletion and compromised behavioral consistency (Morris et al., 2007; Patterson, 1982; Pinquart, 2017). Given the cross-sectional design, all associations are interpreted as contemporaneous and correlational (i.e., not causal).

## Methods

### Participants

The inclusion criteria for the study were as follows: fluency in Italian, heterosexual orientation, caregiving for one or more biological children aged 3–18 still living in the same house, no substance abuse during the 6 months prior to the study, no prescription for psychiatric medications at the time of the study, and no history of developmental disorder, intellectual disability, or neurological disorder.

A community sample of 1,200 cisgender heterosexual parents [ $M=45.60$ ,  $SD=9.37$ ; 840 (70%) were mothers] residing in Italy with at least one biological child with a mean age of 12 years. ( $SD=5.40$ ; age range=3–18;  $n=625$  assigned female at birth, 52.8%) were included in the study. If parents had more than one biological child in the relevant age range, their oldest child (target child) was used as a reference for the questionnaire. The average number of children was 1.75 ( $SD=0.75$ ). Forty-five children (3.75%) were reported by their parents to have physical and/or psychological difficulties. Most parents ( $n=771$ , 64.25%) were married, with the remaining being engaged in a romantic relationship with the other parent of the target child ( $n=259$ , 21.58%), divorced ( $n=100$ , 8.33%), single ( $n=61$ , 5.08%), or widowed ( $n=9$ , 0.75%). In terms of education, 610

parents (50.83%) had a high school degree or lower, whereas 590 (49.17%) had a bachelor's degree or higher. Most parents ( $n=834$ , 69.50%) were employed full-time, while 249 (20.75%) were employed part-time, and the remaining 117 (9.75%) were unemployed.

## Procedure

Participants were recruited using the snowball sampling technique, which involved posting a link to the online questionnaire on social networking platforms (e.g., Facebook and Instagram) and disseminating information through word-of-mouth among participating parents. To avoid self-selection effects, during recruitment, participants were informed that this study focused on the diverse experiences and feelings associated with parenthood during a time of climate change.

To ensure data quality, three attention-check items were embedded in the survey. Informed consent was obtained from all participants, and each participant was assigned a unique reference code to ensure their anonymity. Participants were granted access to a confidential web link on the Qualtrics platform and were informed that the entire assessment process would take approximately 20 min. No incentives were provided for their participation. The study was approved by the Territorial Ethics Committee of Lazio Area 2 (protocol code n. 77.24).

## Measures

### Eco-stress

Parents' climate-related stress was assessed using an adapted version of the 10-item Perceived Stress Scale (PSS; Cohen et al., 1983). The original PSS measures the extent to which individuals perceive their lives as stressful over the past month. In line with prior adaptations of the PSS to specific contexts (e.g., Campo-Arias et al., 2020; Mohamed et al., 2025), each item in the current study was reframed to anchor stress appraisals specifically to climate change (e.g., "Felt nervous or stressed about environmental conditions"). This adaptation enabled the assessment of parents' subjective perceptions of climate change as a salient source of stress while maintaining the original structure and response format of the PSS. Each item was rated on a Likert scale ranging from 0 (*never*) to 4 (*very often*), with higher scores indicating greater perceived eco-stress. Cronbach's alpha was 0.92.

### Parental burnout

The 23-item Parental Burnout Assessment (PBA; Roskam et al., 2018; Italian version in Roskam et al., 2021) measures

four symptoms of parental burnout: (1) exhaustion in parental role (nine items; e.g., "I have zero energy for looking after my child"), (2) contrast in parental self (six items; e.g., "I'm no longer the parent I used to be"), (3) saturation (five items; e.g., "I can't stand my role as father/mother any more"), and (4) emotional distancing (three items; e.g., "I do what I'm supposed to do for my child(ren), but nothing more"). Each item is scored on a 7-point scale ranging from 0 (*never*) to 6 (*every day*). Cronbach's alphas for exhaustion, contrast, saturation, and emotional distancing were 0.93, 0.90, 0.89, and 0.78, respectively.

### Child behavior problems

Parents completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), comprising 25 items, to assess children's psychological adjustment on a 3-point Likert scale ranging from 0 (*never*) to 2 (*true*). The SDQ provides ratings of children's emotional problems, hyperactivity/inattention, conduct problems, peer problems, and pro-social behavior. For the purpose of this study, total scores of internalizing (emotional plus peer items) and externalizing (conduct plus hyperactivity items) problems were calculated, following the recommendations of Goodman et al. (2010) for studying low-risk samples. Higher scores indicate greater problems. The SDQ has been shown to have good internal consistency, test-retest and interrater reliability, and concurrent and discriminative validity (Goodman, 1997). Cronbach's alphas for internalizing and externalizing problems were 0.74 and 0.78, respectively.

### Data analysis

Statistical analyses were conducted using R software (R Core Team, 2024). The dataset was first examined to ensure the accuracy of the data entry. Preliminarily, potential differences in the study variables based on categorical data—parent education (recoded as high school degree or lower vs. bachelor's degree or higher), parent working status (recoded as employed vs. unemployed), parent relationship status (recoded as partnered vs. single), and child gender—were checked with multivariate analyses of variance (MANOVAs) for child behavior problems and parental burnout symptoms, and univariate analysis of variance (ANOVA) for eco-stress, respectively. In addition, participants' descriptive statistics and Pearson's correlations among the study variables were examined. In cases of significant effects of categorical and/or continuous sociodemographic data on child behavior problems, these were entered as covariates in the following analyses.

The study hypotheses were evaluated using SEM. All variables in the model were specified as latent constructs,

with items from the self-report questionnaires serving as manifest indicators. Two SEMs—one for each child behavior outcome—were estimated to test the associations between parental eco-stress and child internalizing and externalizing problems and to evaluate model-implied indirect associations via each parental burnout symptom. Direct (i.e., eco-stress  $\rightarrow$  child problems), indirect (i.e., eco-stress  $\rightarrow$  burnout symptom  $\rightarrow$  child problems), and total associations (i.e., direct+indirect) were computed. To examine the significance of indirect associations, 95% bootstrap confidence intervals (CIs) were used. Consistent with the cross-sectional design, these pathways are interpreted as correlational and do not support temporal or causal inferences.

The model was estimated using the Maximum Likelihood Estimation method. Model fit was evaluated by accounting for complementary goodness-of-fit indexes (Ullman & Bentler, 2013), including the comparative fit index (CFI) and Tucker-Lewis index (TLI) (with values  $\geq 0.95$  indicating good fit and values  $\geq 0.90$  indicating adequate fit); and the root mean square error of approximation (RMSEA; with values  $< 0.05$  indicating excellent fit, values between 0.05 and 0.08 indicating moderate fit, and values between 0.08 and 0.10 indicating acceptable fit, such as the non-statistical significance of its associated 95% confidence interval). Given its sensitivity to sample size, we did not rely on chi-square ( $\chi^2$ ) as the primary index of fit (Bollen, 1989).

### Sample size determination

Given the statistical analysis outlined in the present study, the minimum number of participants required to detect small effects in the more complex model (SEM) was predetermined using a priori power analysis with the *R* package *semPower*. Alpha and RMSEA levels were set at 0.05. For 3 latent variables and 39 item-level indicators, the required sample size to detect small effects with 80% power was  $N=1,258$ . Thus, the obtained sample size approached the threshold for adequate statistical power.

## Results

### Data screening

Given that survey responses were mandatory (forced choice), the only missing data were due to participant dropouts during survey completion. Sixty-nine participants were excluded due to errors in one or more attention-check items. The data distribution was checked using skewness and kurtosis values: all study variables fell within the acceptable values for skewness ( $\pm 2$ ) and kurtosis ( $\pm 7$ ) (West et al., 1995), indicating that the data were normally distributed.

### Differences in study variables based on sociodemographics

A MANOVA indicated a significant multivariate effect of child gender on behavior problems, *Wilks'  $\lambda$*  = 0.97,  $F(2, 1197) = 18.20$ ,  $p < .001$ . Follow-up tests showed that parents of boys reported more externalizing problems than parents of girls,  $F(1, 1198) = 24.70$ ,  $p < .001$ , whereas internalizing problems did not differ by child gender,  $F(1, 1198) = 0.67$ ,  $p = .414$ . Four further MANOVAs showed that neither parent gender, *Wilks'  $\lambda$*  = 1.00,  $F(2, 1197) = 0.56$ ,  $p = .574$ , nor working status (coded as employed vs. unemployed), *Wilks'  $\lambda$*  = 1.00,  $F(2, 1197) = 1.10$ ,  $p = .363$ , nor parent education (coded as high school diploma or lower vs. bachelor's degree or higher), *Wilks'  $\lambda$*  = 1.00,  $F(2, 1197) = 1.05$ ,  $p = .351$ , nor relationship status, *Wilks'  $\lambda$*  = 1.00,  $F(2, 1197) = 1.48$ ,  $p = .228$ , had a significant multivariate effect on children's behavior problems.

Regarding parental burnout symptoms, parent gender had a significant multivariate effect, *Wilks'  $\lambda$*  = 0.98,  $F(4, 1195) = 6.84$ ,  $p < .001$ , with mothers reporting greater exhaustion,  $F(1, 1198) = 20.51$ ,  $p < .001$ , and saturation,  $F(1, 1198) = 8.46$ ,  $p = .004$ , than fathers. However, neither contrast,  $F(1, 1198) = 3.76$ ,  $p = .053$ , nor emotional distancing,  $F(1, 1198) = 1.20$ ,  $p = .274$ , significantly differed between mothers and fathers. Similarly, relationship status had a significant multivariate effect, *Wilks'  $\lambda$*  = 0.98,  $F(4, 1195) = 4.60$ ,  $p = .001$ , with single parents reporting greater exhaustion,  $F(1, 1198) = 6.98$ ,  $p = .008$ , contrast,  $F(1, 1198) = 13.63$ ,  $p < .001$ , saturation,  $F(1, 1198) = 15.79$ ,  $p < .001$ , and emotional distancing,  $F(1, 1198) = 6.56$ ,  $p = .011$ , compared to partnered parents. Conversely, neither working status, *Wilks'  $\lambda$*  = 1.00,  $F(4, 1195) = 1.18$ ,  $p = .320$ , nor parent education, *Wilks'  $\lambda$*  = 1.00,  $F(4, 1195) = 1.17$ ,  $p = .324$ , nor child gender, *Wilks'  $\lambda$*  = 0.99,  $F(4, 1195) = 2.10$ ,  $p = .079$ , had a significant multivariate effect on parental burnout symptoms.

Finally, one ANOVA indicated that eco-stress differed by parent gender, with mothers experiencing higher eco-stress than fathers,  $F(1, 1198) = 20.60$ ,  $p < .001$ . Conversely, working status,  $F(1, 1198) = 0.01$ ,  $p = .925$ , parent education,  $F(1, 1198) = 3.33$ ,  $p = .068$ , relationship status,  $F(1, 1198) = 2.74$ ,  $p = .098$ , and child gender,  $F(1, 1198) = 3.41$ ,  $p = .065$ , had no significant effect on parent eco-stress.

### Bivariate associations among eco-stress, parental burnout symptoms, child behavior problems, and sociodemographics

Higher parental eco-stress was associated with greater levels of all four parental burnout symptoms (exhaustion, saturation, contrast with previous parental self, and emotional distancing) and more child internalizing and externalizing

problems. The four burnout symptoms were positively intercorrelated, and higher scores on each were linked to more child internalizing and externalizing problems. Parent age showed a mixed pattern: older parents reported higher eco-stress and more child internalizing problems, but lower exhaustion and saturation, and fewer child externalizing problems; they also had older children. Younger child age was associated with higher parental exhaustion and saturation and more child externalizing problems, whereas older child age was associated with more child internalizing problems and higher parent age. Parents with more children reported fewer externalizing problems in children. Child internalizing and externalizing problems were positively correlated. Table 1 reports the complete set of bivariate associations and the means and standard deviations of all study variables.

### The influence of eco-stress on child behavior problems through parental burnout symptoms

Given their significant associations with child outcomes, we included parent age, child age, and, only for externalizing problems, the number of children as covariates in the SEM models. Similarly, child gender was entered as a further covariate, given previous evidence indicating gender differences in internalizing and externalizing problems (Rescorla et al., 2007). Parental eco-stress showed a significant direct association with children’s internalizing problems: higher eco-stress was linked to more internalizing symptoms, with no significant indirect effects of the four parental burnout symptoms. The pattern was reversed for externalizing problems. Parental eco-stress was related to externalizing symptoms only indirectly, via two burnout symptoms—exhaustion and saturation. Higher eco-stress was associated with greater exhaustion and saturation, which, in turn, were associated with more child externalizing problems. The direct path from eco-stress to externalizing behavior was not significant. The direct and indirect paths and model fit indices are displayed in Table 2.

Additionally, to quantify explanatory power and the relative contribution of indirect pathways, we report  $R^2$  for all endogenous variables and computed the proportion mediated (PM=total indirect/total effect) using standardized coefficients ( $\beta$ ). The internalizing model explained 23% of variance in child internalizing problems, and the externalizing model explained 24% of variance in child externalizing problems. In both models, eco-stress explained 4%, 2%, 3%, and 2% of the variance in exhaustion, saturation, contrast, and emotional distancing, respectively.

For internalizing problems, the total eco-stress effect was  $\beta$  total = 0.16 ( $\beta$  direct = 0.08;  $\beta$  total indirect = 0.08), corresponding to PM = 50%; however, the specific indirect

**Table 1** Bivariate Associations, Means, and Standard Deviations for Eco-Stress, Parental Burnout Symptoms, Child Behavior Problems, and Sociodemographics (N=1,200 Parents)

| Variables                       | 1.      | 2.       | 3.       | 4.      | 5.      | 6.      | 7.       | 8.      | 9.      | 10. | M     | SD   |
|---------------------------------|---------|----------|----------|---------|---------|---------|----------|---------|---------|-----|-------|------|
| 1. Eco-stress                   | —       |          |          |         |         |         |          |         |         |     | 18.50 | 8.38 |
| 2. Exhaustion                   | 0.18*** | —        |          |         |         |         |          |         |         |     | 7.88  | 9.39 |
| 3. Saturation                   | 0.12*** | 0.82***  | —        |         |         |         |          |         |         |     | 1.86  | 3.76 |
| 4. Contrast in parental self    | 0.15*** | 0.74***  | 0.80***  | —       |         |         |          |         |         |     | 3.01  | 4.87 |
| 5. Emotional distancing         | 0.11*** | 0.65***  | 0.68***  | 0.74*** | —       |         |          |         |         |     | 1.84  | 3.74 |
| 6. Child internalizing problems | 0.12*** | 0.32***  | 0.32***  | 0.37*** | 0.32*** | —       |          |         |         |     | 3.28  | 2.98 |
| 7. Child externalizing problems | 0.08*   | 0.38***  | 0.31***  | 0.34*** | 0.31*** | 0.44*** | —        |         |         |     | 4.13  | 3.13 |
| 8. Parent age                   | 0.08*   | -0.17*** | -0.11*** | -0.05   | <0.01   | 0.07*   | -0.14*** | —       |         |     | 45.60 | 9.37 |
| 9. Child age                    | 0.05    | -0.16*** | -0.09**  | -0.01   | 0.05    | 0.10*** | -0.14*** | 0.77*** | —       |     | 12.00 | 5.49 |
| 10. Number of children          | -0.01   | -0.03    | -0.02    | 0.01    | 0.05    | 0.01    | -0.07*   | 0.38*** | 0.41*** | —   | 1.75  | 0.75 |

Total sum scores are presented for each variable. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

**Table 2** Direct and Indirect Effects, and Model Fit Indices (N = 1,200 Parents)

| Path  | Predictor                 | Estimate | SE   | β 95% C.I. |       | β     | p      | CFI   | TLI   | SRMR  | RMSEA              |
|---|---------------------------|----------|------|------------|-------|-------|--------|-------|-------|-------|--------------------|
|   |                           |          |      | Lower      | Upper |       |        |       |       |       |                    |
| Model outcome: Child internalizing problems                           |                           |          |      |            |       |       |        | 0.982 | 0.981 | 0.055 | .045 <sup>ns</sup> |
| Direct effects  |                           |          |      |            |       |       |        |       |       |       |                    |
| Child internalizing problems  | Eco-stress                | 0.09     | 0.02 | 0.06       | 0.13  | 0.08  | <0.001 |       |       |       |                    |
| Child internalizing problems  | Exhaustion                | 0.14     | 0.10 | -0.07      | 0.34  | 0.12  | 0.183  |       |       |       |                    |
| Child internalizing problems  | Saturation                | 0.26     | 0.14 | -0.02      | 0.53  | 0.23  | 0.063  |       |       |       |                    |
| Child internalizing problems  | Contrast in parental self | 0.33     | 0.21 | -0.08      | 0.74  | 0.29  | 0.119  |       |       |       |                    |
| Child internalizing problems  | Emotional distancing      | 0.30     | 0.20 | -0.09      | 0.70  | 0.27  | 0.135  |       |       |       |                    |
| Exhaustion  | Eco-stress                | 0.19     | 0.01 | 0.18       | 0.20  | 0.19  | <0.001 |       |       |       |                    |
| Saturation  | Eco-stress                | 0.13     | 0.01 | 0.12       | 0.15  | 0.13  | <0.001 |       |       |       |                    |
| Contrast in parental self   | Eco-stress                | 0.17     | 0.01 | 0.15       | 0.18  | 0.16  | <0.001 |       |       |       |                    |
| Emotional distancing  | Eco-stress                | 0.14     | 0.01 | 0.12       | 0.16  | 0.14  | <0.001 |       |       |       |                    |
| Indirect effects  |                           |          |      |            |       |       |        |       |       |       |                    |
| Eco-stress ⇒ Exhaustion ⇒ Child internalizing problems                |                           | 0.03     | 0.02 | -0.01      | 0.07  | 0.02  | 0.183  |       |       |       |                    |
| Eco-stress ⇒ Saturation ⇒ Child internalizing problems                |                           | 0.03     | 0.02 | <0.01      | 0.07  | 0.03  | 0.072  |       |       |       |                    |
| Eco-stress ⇒ Contrast in parental self ⇒ Child internalizing problems |                           | 0.05     | 0.04 | -0.01      | 0.12  | 0.05  | 0.120  |       |       |       |                    |
| Eco-stress ⇒ Emotional distancing ⇒ Child internalizing problems      |                           | 0.04     | 0.03 | -0.01      | 0.10  | 0.04  | 0.140  |       |       |       |                    |
| Model outcome: Child externalizing problems                           |                           |          |      |            |       |       |        | 0.980 | 0.979 | 0.056 | .046 <sup>ns</sup> |
| Direct effects  |                           |          |      |            |       |       |        |       |       |       |                    |
| Child externalizing problems  | Eco-stress                | -0.01    | 0.02 | -0.05      | 0.02  | -0.01 | 0.497  |       |       |       |                    |
| Child externalizing problems  | Exhaustion                | 0.66     | 0.13 | 0.41       | 0.92  | 0.59  | <0.001 |       |       |       |                    |
| Child externalizing problems  | Saturation                | 0.63     | 0.17 | 0.29       | 0.97  | 0.55  | <0.001 |       |       |       |                    |
| Child externalizing problems  | Contrast in parental self | 0.37     | 0.22 | -0.07      | 0.81  | 0.32  | 0.100  |       |       |       |                    |
| Child externalizing problems  | Emotional distancing      | 0.13     | 0.21 | -0.27      | 0.54  | 0.12  | 0.524  |       |       |       |                    |
| Exhaustion  | Eco-stress                | 0.19     | 0.01 | 0.18       | 0.20  | 0.19  | <0.001 |       |       |       |                    |
| Saturation  | Eco-stress                | 0.13     | 0.01 | 0.12       | 0.15  | 0.13  | <0.001 |       |       |       |                    |
| Contrast in parental self   | Eco-stress                | 0.17     | 0.01 | 0.15       | 0.18  | 0.16  | <0.001 |       |       |       |                    |
| Emotional distancing  | Eco-stress                | 0.14     | 0.01 | 0.12       | 0.16  | 0.14  | <0.001 |       |       |       |                    |
| Indirect effects  |                           |          |      |            |       |       |        |       |       |       |                    |
| Eco-stress ⇒ Exhaustion ⇒ Child externalizing problems                |                           | 0.13     | 0.03 | 0.08       | 0.18  | 0.11  | <0.001 |       |       |       |                    |
| Eco-stress ⇒ Saturation ⇒ Child externalizing problems                |                           | 0.08     | 0.02 | 0.04       | 0.13  | 0.07  | <0.001 |       |       |       |                    |
| Eco-stress ⇒ Contrast in parental self ⇒ Child externalizing problems |                           | 0.06     | 0.04 | -0.01      | 0.13  | 0.05  | 0.102  |       |       |       |                    |
| Eco-stress ⇒ Emotional distancing ⇒ Child externalizing problems      |                           | 0.02     | 0.03 | -0.04      | 0.07  | 0.02  | 0.526  |       |       |       |                    |

CI Confidence intervals, CFI comparative fit index, TLI Tucker-Lewis index, SRMR Standardized Root Mean Square Residual, RMSEA Root Mean Square Error of Approximation, Ns not significant

effects were small and non-significant and included offsetting components (e.g., a negative indirect via saturation), so the decomposition should be interpreted cautiously. For externalizing problems, the total effect was  $\beta$  total = 0.24 and was conveyed primarily through indirect

pathways ( $\beta$  total indirect = 0.25;  $\beta$  direct = -0.01), yielding PM=104%. The statistically significant indirect effects via exhaustion ( $\beta$ =0.11) and saturation ( $\beta$ =0.07) accounted for 72% of the total indirect effect and 75% of the total effect.

## Discussion

This study examined whether parents' eco-stress is associated with children's internalizing and externalizing problems and whether specific parental burnout symptoms accounts for these links. Two patterns emerged. First, higher eco-stress was directly associated with more child internalizing problems, and none of the four burnout symptoms carried a significant indirect association. Second, eco-stress was associated with child externalizing problems only indirectly, via two resource-depletion symptoms—parental exhaustion and saturation—while the direct path from eco-stress to externalizing problems was not significant. Although the findings are correlational, they offer pathway specificity by clarifying which parental burnout symptoms are most relevant for which child outcomes in the context of climate-related stress appraisals.

The direct association between parental eco-stress and child internalizing problems is consistent with an *affective-climate pathway*: climate-linked stress can shape child adjustment through family emotional climate and meaning-making even when parenting functioning is not measurably compromised. In this framework, eco-stress may shape children's internalizing symptoms primarily by altering the household's affective tone and appraisal of safety: parents' heightened vigilance, worry, and threat-focused interpretations can be communicated explicitly (through family narratives and climate-related conversations) or implicitly (through emotional contagion and co-regulatory difficulties), thereby increasing children's uncertainty and anxious arousal and, in turn, withdrawal and somatic complaints (Cox & Paley, 1997; Cuartas et al., 2026; Ojala, 2023). At the same time, the absence of symptom-specific indirect associations suggests that, in this sample, internalizing difficulties were not clearly linked to eco-stress through burnout-related resource loss.

By contrast, child externalizing problems were linked to eco-stress only when eco-stress co-occurred with parental depletion. This pattern can be understood through a *resource-depletion pathway*: to the extent that exhaustion and saturation represent proximal parental burnout symptoms in the BR<sup>2</sup> model—markers of reduced capacity and saturation with the parenting role (Mikolajczak & Roskam, 2018; Roskam et al., 2021)—these states can plausibly undermine parenting functions that are particularly consequential for child externalizing problems, including consistency, monitoring, and conflict repair, thereby increasing the likelihood of coercive exchanges and behavioral dysregulation (Deater-Deckard, 1998; Patterson, 1982; Pinquart, 2017). In this sense, the symptom-specific mediation helps explain why eco-stress did not show a direct association with externalizing problems: for disruptive behavior,

parenting-relevant impairment may be a more proximal lever than stress appraisal per se.

Considered in terms of magnitude, both models accounted for roughly one quarter of the variability in children's internalizing and externalizing difficulties, which is meaningful in a community sample while also underscoring that child adjustment reflects multiple determinants beyond climate-related stress appraisals. Eco-stress explained only a modest share of variance in parents' burnout symptoms, suggesting that climate-related strain is one contributor within a broader constellation of demands and resources shaping parental depletion. For internalizing problems, the eco-stress association appeared diffuse rather than symptom-specific: the indirect component was not expressed through robust, convergent symptom-level pathways, and some indirect components were countervailing. Accordingly, the decomposition should not be read as evidence for a distinctive parental burnout-mediated pathway for internalizing outcomes. For externalizing problems, by contrast, the overall pattern was consistent with an effectively indirect association concentrated in resource-depletion symptoms—especially exhaustion and saturation—aligning with the idea that depleted parents may have fewer self-regulatory resources to contain escalation and sustain consistent limit-setting.

Notably, the more identity- and relationship-oriented burnout symptoms (contrast in parental self and emotional distancing) did not emerge as mediators for either outcome. This aligns with symptom-progression accounts suggesting that depletion symptoms often arise earlier and are more prevalent in community samples, whereas contrast and distancing may require greater chronicity or a more severe demand-resource imbalance to translate into observable day-to-day disruptions (Roskam et al., 2021). It is also plausible that later-stage symptoms are more consequential for relational outcomes that are not captured by SDQ internalizing and externalizing scales. Longitudinal work is therefore necessary to test whether eco-stress predicts within-family transitions from depletion symptoms to more advanced symptoms of parental burnout and whether those later symptoms carry distinct child risks over time.

Cross-cultural and gender considerations further qualify interpretation. Our data come from an Italian community sample; cultural norms around parenting roles, climate communication, and available supports may shape both levels of eco-stress and how it translates into parenting strain. Replication across countries with different climate exposure profiles and policy infrastructures will be essential for assessing generalizability and identifying context-specific protective factors (Cuartas et al., 2026). In addition, mothers reported higher eco-stress and higher exhaustion and saturation than fathers in preliminary analyses, consistent with gendered divisions of caregiving and emotional labor (Roskam &

Mikolajczak, 2020). Because child gender and child age were modeled as covariates, we did not test whether structural pathways varied by gender or developmental timing. Future multi-group or interaction-based SEMs should examine moderation to clarify whether the resource-depletion and affective-climate pathways vary across mothers versus fathers, parents of younger versus older children, and parents of sons versus daughters.

Overall, the findings are consistent with transactional models of stress and parenting (Deater-Deckard, 1998) and with the BR<sup>2</sup> model's emphasis on exhaustion and saturation as proximal indicators of resource loss that can precede more chronic symptoms such as contrast and emotional distancing (Mikolajczak & Roskam, 2018; Mikolajczak et al., 2023; Roskam et al., 2021). By modeling parental burnout symptoms individually rather than relying on a global score, this study identifies which facets most clearly link eco-stress to child externalizing difficulties in a community context.

### Strengths, limitations, and future directions

This study has several strengths, including a large community sample, latent-variable SEM with bootstrapped indirect effects, and a symptom-specific approach to parental burnout that moves beyond global scores. Conceptually, it integrates role-specific burnout theory (BR<sup>2</sup>) with family-systems perspectives to articulate outcome-specific pathways linking climate-related stress to child adjustment.

However, several limitations should be acknowledged. First, the cross-sectional design precludes temporal ordering and causal inference; reciprocal pathways are plausible (e.g., child behavior problems may heighten parental depletion and climate-related stress appraisals) (Woine et al., 2025). Second, all constructs were assessed via parent self-report, raising the possibility of shared-rater effects and common method variance (Podsakoff et al., 2003). Although anonymity likely reduced evaluation apprehension, method-related inflation cannot be ruled out; future work should incorporate response-bias measures, multi-informant data (e.g., partner and teacher reports), and observational or administrative indicators when feasible. Third, eco-stress was operationalized via an adapted PSS; while this follows prior stressor-specific adaptations, the climate-specific version warrants fuller psychometric validation and clearer differentiation from general perceived stress. Fourth, online snowball recruitment may over-represent climate-attentive and digitally connected parents, limiting population generalizability. Finally, the sample comprised cisgender heterosexual biological parents in Italy; pathways may differ in more diverse family structures and cultural contexts.

Future research can build on these findings in several concrete ways. Longitudinal and intensive longitudinal designs can test directionality and whether climate-linked hassles prospectively forecast increases in exhaustion and saturation and subsequent changes in parenting and child adjustment. Multi-method approaches should combine perceived eco-stress with objective exposure indicators (e.g., heat index, air-quality alerts, disruption frequency) to clarify when perceived versus environmental stressors matter most. Moderation analyses should test whether pathways vary by parent gender, child developmental stage, socioeconomic strain, and coparenting resources (e.g., Cruciani et al., 2024; Ren et al., 2024; Tracchegiani & Carone, 2025). Finally, intervention studies can evaluate whether targeting parental resource restoration reduces exhaustion and saturation and attenuates child externalizing difficulties, while stress-containment and family-communication strategies reduce internalizing difficulties in families with high eco-stress.

### Theoretical and clinical implications

The findings refine theory by distinguishing an affective-climate pathway for child internalizing problems from a resource-depletion pathway for child externalizing problems. Modeling the four PBA symptoms separately suggests that, in community contexts, exhaustion and saturation are the parental burnout facets most closely tied to children's disruptive behavior, whereas children's internalizing symptoms may be more tightly coupled to parents' climate-related stress appraisals and the family's affective tone. This symptom-level mapping adds specificity to the BR<sup>2</sup> framework (Mikolajczak & Roskam, 2018) and supports an empirically grounded hypothesis about when climate-related stress is more likely to manifest in children through parenting-related impairment versus through emotional climate and meaning-making.

Practical implications follow for multiple stakeholders. For clinicians and family psychologists, assessing eco-stress alongside symptom-specific parental burnout can help differentiate intervention targets. When children present primarily with internalizing problems, work may focus on helping parents contain climate-related worry, calibrate children's exposure to threat-salient information, and support developmentally appropriate climate conversations and routines. When children present with externalizing problems, screening for exhaustion and saturation can flag the need for resource-restoration steps (e.g., respite planning, load redistribution between caregivers, and micro-recovery routines) before or alongside behavior-focused parenting support aimed at strengthening consistency and conflict repair.

For schools and community services, the findings underscore that climate-linked disruptions (e.g., heat alerts and schedule changes) may coincide with increased child anxiety or behavioral dysregulation. Clear routines, timely caregiver communication, and referral pathways to psychological supports may be particularly important during periods of heightened environmental disruption. Integrating parental burnout screening into family support settings and expanding access to tangible supports (childcare/respice options, flexible service delivery during heat or air-quality events, and signposting to climate-informed counseling) may help interrupt resource-loss spirals reflected in exhaustion and saturation.

## Conclusion

In this Italian community sample, parents' eco-stress was associated with children's internalizing problems directly, whereas associations with children's externalizing problems were indirect and operated through parental exhaustion and saturation. Although causal inference is not warranted, the symptom-specific findings sharpen understanding of how eco-stress may be relevant for family functioning: internalizing risk appears more tightly linked to affective climate and stress appraisals, whereas externalizing risk appears more tightly linked to parental resource depletion. Future longitudinal, multi-informant, and cross-cultural research is needed to test directionality, moderation by parent gender and developmental timing, and the contribution of objective environmental disruptions. Practically, the findings support climate-aware, family-focused prevention that combines stress-containment and communication strategies with concrete resource supports to reduce depletion and promote consistent caregiving.

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**Authors contribution** N.C.: Conceptualization; Data curation; Analysis; Software; Investigation; Methodology; Project administration; Resources; Supervision; Validation; Visualization; Writing – original draft. G.C.: Data curation; Investigation; Methodology; Resources; Visualization; Writing – review & editing. J.T.: Conceptualization; Data curation; Analysis; Investigation; Methodology; Resources; Visualization; Writing – review & editing.

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**Data availability** The datasets used and/or analyzed during the present study are available from the corresponding author upon reasonable request.

## Declarations

**Ethical approval** The study was approved by the Territorial Ethics Committee of Lazio Area 2 (protocol code n. 77.24).

**Consent to publish** Participants have agreed for their anonymized data/information to be published.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

**Generative AI and AI-assisted technologies in the writing process** No Generative AI and AI-assisted technologies were used in the preparation of this manuscript.

**Competing interests** Nicola Carone is an Associate Editor of *Current Psychology* and Guest Editor for this Collection. As such, he could not edit his own paper. So, the handling editor for this manuscript was Editor-in-Chief Lauren S. Seifert.

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