An exploratory statistical cusp catastrophe model for the prediction of the effect of special education teachers' emotional intelligence on their burnout

Alexandros-Stamatios Antoniou[1], Garyfalia Charitaki[2]*, Kyriaki Pavlidou[3] and Anastasia Alevriadou[4]

[1]Department of Primary Education, National and Kapodistrian University of Athens, Athens, Greece, [2]Department of Primary Education, University of Ioannina, Ioannina, Greece, [3]Department of Primary Education, University of Western Macedonia, Florina, Greece, [4]Department of Psychology, Aristotle University of Thessaloniki, Thessaloniki, Greece

In the present research, the relationship between emotional intelligence and burnout was investigated in a sample of Greek special education teachers. The cusp catastrophe model was used for the statistical analysis. Based on the analysis, emotional intelligence was negatively correlated with burnout. Surprisingly, this negative relationship was reversed when the increase in the level of emotional intelligence exceeded a certain point. There seems to be a fragile balance between caring and caring too much. Teachers who cannot regulate their sentimentality can be overwhelmed by emotions and become prone to stress and burnout. The cusp catastrophe model managed to describe that phenomenon more satisfactorily than the linear and quadratic models tested. According to the other analysis results, factors such as mental resilience and self-efficacy had a negative relationship with burnout. Practical implications such as emotional intelligence training and self-focus wellbeing were discussed.

KEYWORDS

special education, burnout, emotional intelligence, cusp catastrophe model, teachers

Keypoints:

- Teachers with high levels of Emotional Intelligence can identify emotional triggers and find constructive ways of managing emotions that benefit learners.
- The cusp catastrophe model, demonstrated that there is a fragile balance between caring and caring too much.
- In-service programs for teachers could include training in EI.

Introduction

Burnout is a major issue in education because it often causes teachers to resign (Madigan and Kim, 2021). In special education, the phenomenon of leaving the profession or turning to general education is particularly elevated (Billingsley and Bettini, 2019). Burnout rates are significantly higher among special education teachers (Robinson et al., 2019). Current research has identified emotional intelligence (EI) as one of the protective factors against burnout and also for reducing teachers' intention to leave (Mérida-López et al., 2020).

By definition, burnout results from accumulated stress at work leading to severe physical and mental exhaustion (Freudenberger, 1974). According to Maslach and Jackson (1981), burnout consists of three components: emotional exhaustion, depersonalization, and diminished personal growth. Teacher burnout levels are influenced by age, gender, number of hours per week of instruction, and family background (Bianchi et al., 2021). Teachers in special education face daily stressors such as challenging working conditions, insufficient support from the government (Antoniou et al., 2009), and challenging behaviors of their students (Aloe et al., 2014). As a result, burnout can be expressed early, which has a significant impact on health, wellbeing, and performance (Conley and You, 2017; Pavlidou et al., 2022). Once one develops the necessary resilience, positive strategies can eliminate the negative effects of stress (Martínez-Monteagudo et al., 2019). Thus, developing emotional intelligence can help reduce teacher burnout (Puertas Molero et al., 2019).

Respectively, EI is the ability of a person to acknowledge, regulate, express, and reason his feelings as well as a person's capability of recognizing differentiating, and understanding other people's emotions through their behavior (Salovey and Mayer, 1990). It consists of four basic elements which include affectivity, self-regulation, emotional wellbeing, and extraversion (Petrides and Furnham, 2001). EI has been demonstrated to be associated with better social interaction (Macula, 2017), leadership skills (Gómez-Leal et al., 2022), improved teaching (Wu et al., 2019), and enhanced mental wellbeing (Puertas Molero et al., 2019). The question of whether EI comprises abilities or personality traits has been controversial (Mayer et al., 2001; Petrides and Furnham, 2001).

Daily, special education teachers need to use their EI to understand contextual signals and determine the most suitable emotions and responses. Platsidou (2010) indicated that special education Greek teachers exhibited relatively high scores in both the distinct components and the overall EI. The perceived EI demonstrated a significant correlation with burnout syndrome. This suggests that teachers with higher EI exhibited reduced burnout. High levels of EI are associated with low levels of burnout in special education teachers and this relationship does not seem to be influenced by gender, qualification, and experience (Al-Bawaliz et al., 2015).

One factor that appears to relate to teachers' burnout is self-efficacy. It can be referred to as a person's belief in his or her capability to organize and execute actions that are necessary for the attainment of certain goals (Bandura, 1977). With time, this belief is shaped by experience and through interaction with others. Consequently, it influences an individual's decisions, efforts, behavior, resilience as well as strategies employed when handling challenges and setbacks (Schunk and Meece, 2006). Teaching effectiveness in contrast to personal teaching efficacy includes the belief that teachers know that they can motivate students who are considered difficult. This concept differs from general teaching competence whereby it involves elements such as organizational systems or family support and socio-economic background and refers to how teachers see themselves (Kamboj and Garg, 2021).

Teachers who have a strong belief in their abilities (self-efficacy) tend to experience higher levels of job satisfaction and lower levels of professional burnout (Skaalvik and Skaalvik, 2010).

Such teachers are more likely to utilize supportive strategies when dealing with challenging behavior from children with special educational needs and disabilities in inclusive classrooms (Almog and Shechtman, 2007). Additionally, research has shown that self-efficacy is a significant predictor of professional burnout in teachers working in inclusive education settings (Cappe et al., 2017). The relationship between teacher self-efficacy and burnout is a major area of study (Skaalvik and Skaalvik, 2017).

Another factor that seems to reduce teachers' burnout is mental resilience (Burić et al., 2019). According to Sun et al. (2014), resilience consists of five factors namely willpower, family support, optimism and self-confidence, problem-solving, and interpersonal interaction. Resilience has been studied in relation to both burnout and emotional intelligence. It seems to be positively associated with emotional intelligence (López-Angulo et al., 2022) and negatively with burnout. It may also mediate the relationship between affective intelligence and burnout (Kamboj and Garg, 2021), which may lend it a role as a protective factor against burnout (De Vera and Gabar, 2020). Resilient teachers can regulate feelings while facing challenges that cause burnout (Zhang and Luo, 2023), such as provoking student behavior, demanding working conditions, or difficult parents (Li et al., 2019; Sideridis and Alghamdi, 2023). Also, they are more adaptive, resourceful, and optimistic, which allows them to address issues as they arise, rather than let them overwhelm them (Kangas-Dick and O'Shaughnessy, 2020). They often rely on their families and social interactions for support, wellbeing, and relaxation (Muller et al., 2011, p. 553).

Recapitulating, it can be argued that teacher burnout is a concept that is influenced by many factors, such as emotional intelligence, self-efficacy, and mental resilience. The way of studying the relationship between these variables in most cases followed the logic of a linear correlation. However, in cases of multifactorial concepts, the approach of other, non-linear models could perhaps better describe the phenomena. Sometimes, predictions are limited with a simple straight line- model. Therefore, in this research, an attempt is made to study the relationship between emotional intelligence, self-efficacy, mental resilience, and burnout by applying a non-linear model, specifically the cusp catastrophe model.

Specifically, Zeeman (1977) set the theoretical framework for the cusp catastrophe model in 1977. It has been used in various fields to explain unpredicted changes in variables' correlations (Guastello, 2001; Stamovlasis and Tsaparlis, 2012). The tipping point or cusp of the model denotes the point where an abrupt change occurs in one or more variables causing a reversal of the expected path of a dependent variable. The model graph is a curved surface with many dimensions. Usually, the change is described as a discontinuity, it is abrupt and unexpected. The appropriate application of the cusp catastrophe model from the Nonlinear Dynamical Systems theory can successfully describe social systems and predict reversals and disturbances in the smooth evolution of a phenomenon with relatively simple underlying dynamics (Chen and Chen, 2017).

In this study, the cusp catastrophe model is used to explore the relationship between EI and special teachers' burnout. It is expected to provide a better fit than the linear or logistic model. Secondly, it is hypothesized that EI, resilience, and burnout would have a negative correlation with burnout.

TABLE 1   Description of the sample's characteristics (*n* = 523).

Characteristic	Sample (*n* = 523) Number (percentage)	Characteristic	Sample (n = 523) Number (percentage)
Age (years)		**The level of education that the teacher is employed**	
25–30	217 (41.5%)	Primary	309 (59.1%)
31–35	72 (13.8%)	Secondary	214 (40.9%)
36–40	56 (10.7%)		
41–45	43 (8.2%)		
46–50	60 (11.5%)		
51–55	62 (11.9%)		
56–60	10 (1.9%)		
61–65	3 (.6%)		
Marital status		**Teaching hours per week**	
Married	209 (40.0%)	0–10	28 (5.35%)
Single	246 (47.0%)	11–20	148 (28.30%)
Divorced	22 (4.2%)	21–30	347 (66.55%)
In cohabitation	43 (8.2%)		
Other (e.g., widowed, engaged etc.)	3 (.6%)		
Number of children in the family		**Teaching experience (years)**	
0	332 (63.5%)	0–10	309 (59.08%)
1	56 (10.7%)	11–20	140 (26.77%)
2	107 (20.5%)	21–30	49 (9.37%)
3	28 (5.4%)	≥31	25 (4.78%)
Gender			
Male	81 (15.5%)		
Female	442 (84.5%)		

TABLE 2   Rotated Factor Matrix (EFA factor loadings) and communalities for the Maslach Burnout Inventory (MBI-ES).

Measured variables (*N* = 523)	Factor_2 Emotional exhaustion Cronbach's alpha: α = 0.889 Bollen's omega: ω = 0.823	Factor_3 Depersonalization Cronbach's alpha: α = 0.894 Bollen's omega: ω = 0.843	Factor_4 Personal accomplishment Cronbach's alpha: α = 0.871 Bollen's omega: ω = 0.876	Communalities
BO.8	0.821			0.876
BO.1	0.804			0.810
BO.3	0.789			0.795
BO.20	0.757			0.787
BO.2	0.740			0.751
BO.13	0.619			0.651
BO.11		0.776		0.719
BO.10		0.756		0.705
BO.15		0.662		0.685
BO.5		0.647		0.667
BO.22		0.556		0.565
BO.16		0.469		0.516
BO.9			0.750	0.764
BO.7			0.742	0.711
BO.19			0.722	0.757
BO.17			0.642	0.640
BO.4			0.555	0.551
BO.21			0.496	0.542

Extraction method: maximum likelihood. Rotation method: promax with Kaiser normalization. Loadings < 0.30 were excluded.

TABLE 3 Rotated Factor Matrix (EFA factor loadings) and communalities for the Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF).

Measured variables (N = 523)	Factor_1 Sentimentality Cronbach's alpha: α = 0.856 Bollen's omega: ω = 0.844	Factor_2 Self-control Cronbach's alpha: α = 0.891 Bollen's omega: ω = 0.851	Factor_3 Wellbeing Cronbach's alpha: α = 0.798 Bollen's omega: ω = 0.802	Factor_4 Sociability Cronbach's alpha: α = 0.876 Bollen's omega: ω = 0.846	Communalities
EQI.20	0.786				0.719
EQI.24	0.777				0.758
EQI.27	0.741				0.748
EQI.29	0.686				0.658
EQI.30	0.585				0.588
EQI.3	0.521				0.561
EQI.12	−0.497				0.518
EQI.5	−0.491				0.501
EQI.15	0.464				0.498
EQI.19	0.417				0.471
EQI.16		0.716			0.724
EQI.28		0.660			0.686
EQI.17		−0.560			0.595
EQI.13		0.549			0.541
EQI.2		0.527			0.502
EQI.23			0.674		0.633
EQI.22			0.641		0.607
EQI.7			0.603		0.599
EQI.10			0.527		0.568
EQI.8			0.514		0.551
EQI.14			0.424		0.513
EQI.11				0.759	0.719
EQI.6				0.665	0.609
EQI.26				−0.497	0.562

Extraction method: maximum likelihood. Rotation method: promax with Kaiser normalization. Loadings < 0.30 were excluded.

Materials and methods

Sample

A total number of *n* = 523 participants, teachers working in public schools in Greece, were recruited for this study through random sample technique. The distribution of the sample across gender was not equal to a situation, which is representative of the Greek education system. Males comprised 15.5% of the sample, while females comprised 84.5%. The sample teachers had a wide range of teaching experience from naïve to experienced teachers. A detailed description of the teachers' characteristics is presented in Table 1.

Measures

The items of each measure can be found in Supplementary material.

The Maslach Burnout Inventory

The questionnaire (Maslach et al., 1986) consists of 18 items rated on a seven-point Likert scale (*0 = never to 6 = every day*). A total number of four items were discarded because they were loaded on multiple factors. The questionnaire assesses teacher burnout through three dimensions namely: emotional exhaustion, depersonalization, and personal accomplishment. Results from EFA and CFA supported construct validity. More specifically, all goodness of fit indices generated by CFA were found satisfactory (TLI = 0.974 > 0.950, RMSEA = 0.038 < 0.080, CFI = 0.952 ≥ .900, χ^2/df < 2, *p* = 0.164 and SRMR = 0.017 < 0.080). The correlational analysis supported the internal consistency of the construct. Further evidence for internal consistency was provided by the estimation of coefficient omega which was formed at 0.891 (Table 2).

TABLE 4 Rotated Factor Matrix (EFA factor loadings) and communalities for the Chinese Mental Resilience Scale (CMRS).

	Factor_1 Willpower Cronbach's alpha: α = 0.861 Bollen's omega: ω = 0.855	Factor_2 Family support Cronbach's alpha: α = 0.798 Bollen's omega: ω = 0.802	Factor_3 Optimism/self-confidence Cronbach's alpha: α = 0.813 Bollen's omega: ω = 0.811	Factor_4 Problem-solving Cronbach's alpha: α = 0.911 Bollen's omega: ω = 0.903	Factor_5 Interpersonal interaction Cronbach's alpha: α = 0.855 Bollen's omega: ω = 0.807	Communalities
R.23	0.908					0.836
R.21	0.831					0.824
R.22	0.825					0.816
R.16	0.807					0.807
R.26	0.653					0.665
R.31	0.443					0.525
R.8		0.707				0.740
R.12		0.684				0.652
R.11		0.530				0.670
R.3		0.472				0.575
R.10		0.463				0.536
R.18			0.612			0.758
R.2			0.534			0.650
R.14			0.508			0.675
R.7			0.438			0.536
R.15			0.435			0.505
R.4			0.408			0.520
R.17			0.400			0.502
R.9				0.666		0.703
R.13				0.574		0.676
R.6				0.506		0.676
R.19				0.504		0.656
R.1				0.440		0.557
R.27				−0.426		0.582
R.5				0.411		0.557
R.29				−0.386		0.552
R.28				−0.385		0.503
R.25					0.802	0.695
R.30					0.652	0.576
R.20					0.448	0.462
R.24					0.415	0.552

Extraction method: maximum likelihood. Rotation method: promax with Kaiser normalization. Loadings < 0.30 were excluded.

Trait Emotional Intelligence Questionnaire-Short Form

The *Trait Emotional Intelligence Questionnaire – Short Form* (*TEIQue-SF*) (Petrides and Furnham, 2001) consists of 30 items rated on a seven-point Likert scale (*1 = completely disagree to 7 = completely agree*). A total number of six items were discarded because they were loaded on multiple factors. The questionnaire assesses emotional intelligence through four dimensions namely: sentimentality, self-control, wellbeing, and sociability. Results from EFA and CFA supported construct validity. More specifically, all goodness of fit indices generated by CFA were found satisfactory (TLI = 0.952 > 0.950, RMSEA = 0.052 < 0.080, CFI = 0.934 ≥ 0.900, χ^2/df < 2, p = 0.117 and SRMR = 0.031 < 0.080). The correlational analysis supported the internal consistency of the construct. Further evidence for internal consistency was provided

TABLE 5 Factor Matrix (EFA factor loadings) and communalities for the Personal Teaching Efficacy Scale (PTE).

	Factor_2 (PP) Cronbach's alpha: α = 0.908 Bollen's omega: ω = 0.913	Communalities
PSE.2	0.923	0.851
PSE.1	0.921	0.732
PSE.4	0.856	0.670
PSE.3	0.755	0.770
PSE.6	0.608	0.849

Extraction method: maximum likelihood. Rotation method: promax with Kaiser normalization. Loadings < 0.30 were excluded.

by the estimation of coefficient omega which was formed at 0.831 (Table 3).

Chinese Mental Resilience Scale

The *Chinese Mental Resilience Scale* (*CMRS*) (Sun et al., 2014) consists of 31 items rated on a seven-point Likert scale (*1 = completely disagree to 7 = completely agree*). The questionnaire assesses mental resilience through five dimensions namely: willpower (e.g., "I live a happy life."), family support (e.g., "I receive emotional support from my family during difficult periods."), optimism/self-confidence (e.g., "I believe in myself."), problem-solving (e.g., "I can consider a variety of different points of view for a problem."), and interpersonal interaction (e.g., "I can rely on my friends in times of difficulty."). Results from EFA and CFA supported construct validity. More specifically, all goodness of fit indices generated by CFA were found satisfactory (TLI = 0.964 > 0.950, RMSEA = 0.044 < 0.080, CFI = 0.933 ≥ 0.900, χ^2/df < 2, p = 0.204 and SRMR = 0.033 < 0.080). The correlational analysis supported the internal consistency of the construct. Further evidence for internal consistency was provided by the estimation of coefficient omega which was formed at 0.841 (Table 4).

Personal Teaching Efficacy Scale

The Personal Teaching Efficacy Scale (PTE) (Kamboj and Garg, 2021) consists of 5 items rated on a six-point Likert scale (*1 = strongly agree to 6 = strongly disagree*). The questionnaire assesses teachers' self-perception for their teaching efficacy. Results from EFA and CFA supported construct validity/unidimensional structure. More specifically, all goodness of fit indices generated by CFA were found satisfactory (TLI = 0.971 > 0.950, RMSEA = 0.037 < 0.080, CFI = 0.952 ≥ 0.900, χ^2/df < 2, p = 0.413 and SRMR = 0.036 < 0.080). The correlational analysis supported the internal consistency of the construct. Further evidence for internal consistency was provided by the estimation of coefficient omega which was formed at 0.913 (Table 5).

Data analysis

Data analysis was implemented with the use of R. Firstly, we performed an Exploratory Factor Analysis (EFA), with the extraction method of Maximum Likelihood and the method of Varimax Rotation with Kaiser Normalization. A Confirmatory Factor Analysis was also performed. A variety of Goodness of Fit indexes were estimated, including Model Chi-Square (p > 0.05), Confirmatory Fix Index (CFI ≥ 0.90), Tucker-Lewis Index (TLI ≥ 0.95), Root Mean Square Error of Approximation (RMSEA < 0.08) and (Standardized) Root Mean Square Residual (SRMR < 0.08) (Hooper et al., 2008; Kline, 2015). We also estimated measures of internal consistency, such as Cronbach's alpha, and McDonald's Omega coefficients (McDonald, 1999; Revelle and Condon, 2019). Then, we evaluated linear, quadratic, and cubic models to select a model with the best fit for the description of the association of teacher's emotional intelligence with burnout. Since the association between the teacher's emotional intelligence and burnout is better described through a cubic model, a cusp catastrophe modeling approach was employed to reveal potential effects on teachers' burnout. Finally, a second catastrophe modeling approach was employed to evaluate the specific effects of the dimensions of emotional intelligence. For the estimation of the cusp catastrophe model we employed the maximum likelihood method. Ethics committee approval was obtained by

TABLE 6 Parameter estimates of the cusp model 1 for the prediction of teacher burnout.

Terms in cusp model 1	b	CI b95% Low	CI b95% High	SE	Z-value	p-value
a: Intercept of asymmetry variables	−0.145	−0.211	−0.087	0.197	−1.798	0.024
a_1: Personal Teaching Efficacy Scale (PTE)	−0.338	−0.385	−0.307	0.046	−10.784	0.005
a_2: Mental resilience	−0.285	−0.427	−0.169	0.076	−13.456	0.019
a_3: Teaching experience (years)	0.572	0.418	0.714	0.102	18.362	0.013
a_4: Age (years)	−0.213	−0.287	−0.211	0.023	−11.235	0.005
a_5: Teaching hours per week	−0.182	−0.286	−0.106	0.003	−10.364	0.004
b: Intercept of bifurcation variable	−0.394	−0.419	−0.377	0.071	−8.456	0.012
b: Emotional intelligence	−0.463	−0.476	−0.452	0.062	−14.567	0.009
w: Intercept of outcome variable	−0.309	−0.356	−0.268	0.054	−16.356	0.014
w: Teacher burnout	0.809	0.721	0.905	0.013	94.126	0.001

FIGURE 1
Cusp catastrophe model 1 (from the stable upper to the lower attractor).
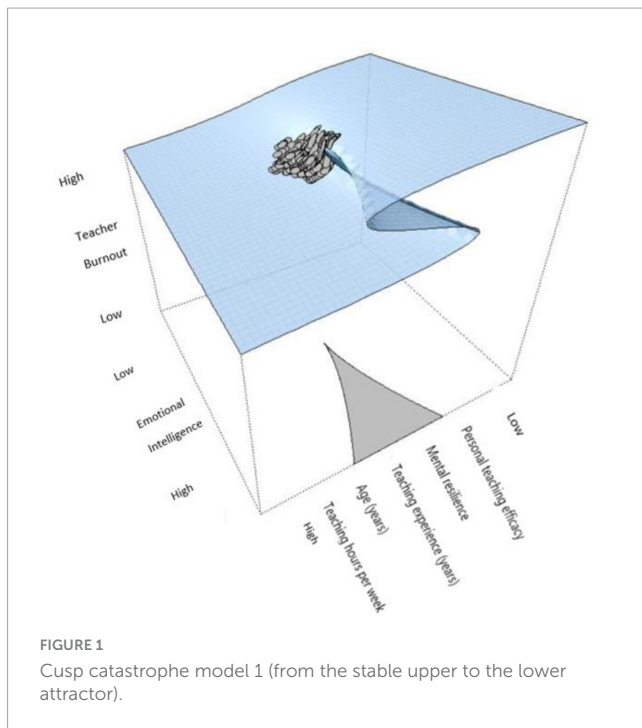
the Department of Primary Education—National Kapodistrian University of Athens.

Results

Selecting a model for the description of the association of teacher's emotional intelligence with burnout

Since both quadratic and cubic equation has a cusp catastrophe, it is important to specify the nature of the associations among the variables assessed (emotional intelligence and burnout). Results suggested that the model with the best fit was the cubic model (b = -0.038, p = 0.000, R^2 = 77.66%). The quadratic (b = 0.081, p = 0.000, R^2 = 57.02%) and the linear model (b = 0.161, p = 0.000, R^2 = 49.71%) demonstrated worse fits.

Employing a cusp catastrophe modeling approach to describe the effect of emotional intelligence on teacher burnout

The intercept of asymmetry variables included teachers' personal teaching efficacy, mental resilience, teaching experience (years), age (years), and teaching hours per week. The intercept of the bifurcation variable included teachers' emotional intelligence. The intercept of the outcome variable included the teachers' burnout (Table 6). As we can see in Table 6 some variables contribute either positively, or negatively to teachers' burnout. Through catastrophe theory, we can identify critical points of the function assessed. In these points, not only the first derivative but also one or more higher derivatives of the function assessed are also

zeroed. The analysis suggested that this is exactly the case when we assess the effect of emotional intelligence on teachers' burnout, meaning that there is a critical point and a specified area where the teachers' burnout is chaotic.

All asymmetry variables (personal teaching efficacy, mental resilience, teaching experience (years), age (years), and teaching hours per week) proved to have a significant effect on special education teachers' burnout (Figures 1, 2). Variations among the effects mentioned above were observed, meaning that other variables had a positive, while others had a negative effect. The suggested cusp model highlighted the significant effect of the bifurcation variable "Emotional Intelligence" on special education teachers' burnout (Table 6). Results from the chi-square difference test suggested that the covariance among the above variables is better described through the cusp model compared to a linear model [$\chi^2(2)$ = 349.425, p < 0.001]. Additionally, information criteria namely Akaike Criterion, Akaike Criterion Corrected, and Bayesian Information Criterion were used for the comparison of the linear, logistic, and cusp model. Analysis suggested significantly different values of the cusp compared to the linear and logistic models (Table 7).

Since both quadratic and cubic equation has a cusp catastrophe, it is important to specify the nature of the associations among the variables assessed (sentimentality and burnout). Results suggested that the model with the best fit was the cubic model (b = -0.304, p = 0.000, R^2 = 56.13%). The quadratic (b = -0.081, p = 0.000, R^2 = 14.08%) and the linear model (b = -0.091, p = 0.000, R^2 = 8.06%) demonstrated worse fits.

Emotional intelligence is measured through four dimensions including self-control, wellbeing, sociability, and sentimentality. Consequently, we supposed that a further investigation should be made through a second cusp catastrophe model. The intercept of asymmetry variables included teachers' self-control, wellbeing, and sociability. The intercept of the bifurcation variable included teachers' sentimentality. The intercept of the outcome variable included the teachers' burnout (Figures 3, 4; Table 8). As we can see in Table 8, the variables that contribute negatively to teachers' burnout.

More specifically, all asymmetry variables (teachers' self-control, wellbeing, and sociability) proved to have a significant effect on special education teachers' burnout. The suggested cusp model highlighted the significant effect of the bifurcation variable "sentimentality" on special education teachers' burnout (Table 8). Results from the chi-square difference test suggested that the covariance among the above variables is better described through the cusp model compared to a linear model [$\chi^2(2)$ = 377.112, p < 0.001]. Additionally, information criteria namely Akaike Criterion, Akaike Criterion Corrected, and Bayesian Information Criterion were used for the comparison of the linear, logistic, and cusp model. Analysis suggested significantly different values of the cusp compared to the linear and logistic models (Table 9).

Discussion

In the present research, the relationship between emotional intelligence and burnout in special education teachers in Greece was studied, using the cusp catastrophe model. According to the research results, the model provided the best fit, when compared
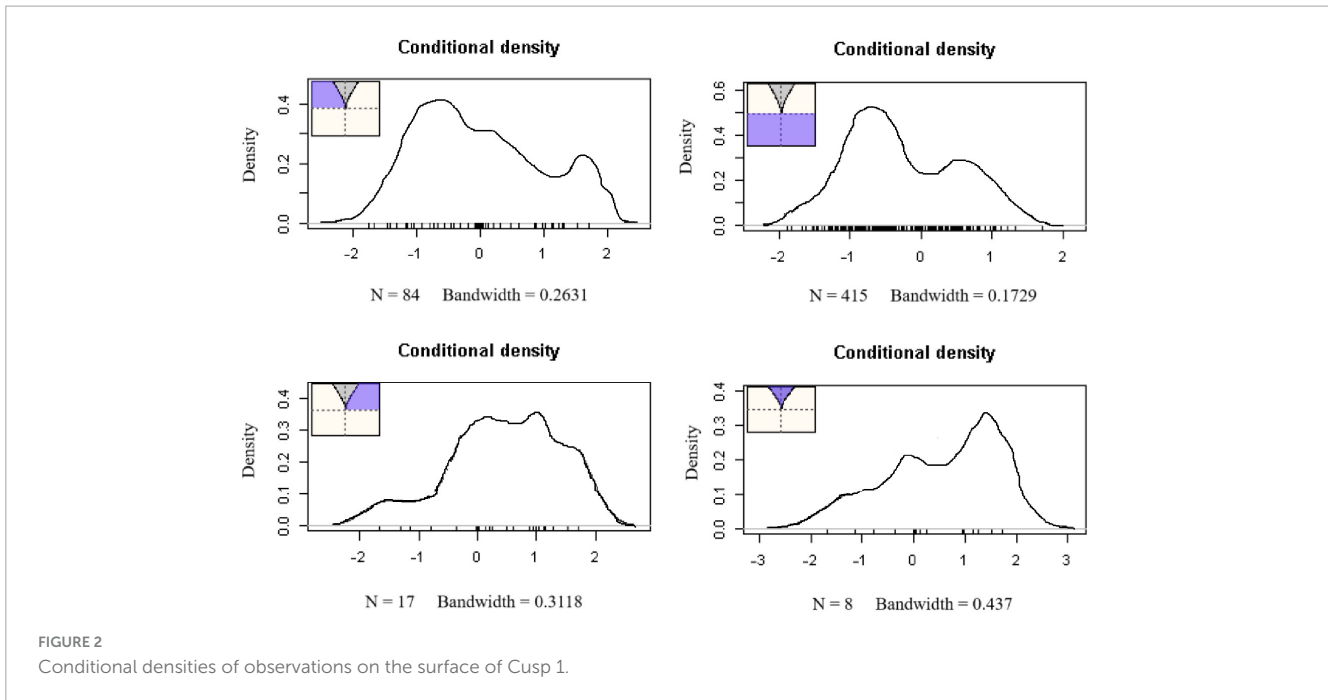
FIGURE 2
Conditional densities of observations on the surface of Cusp 1.

TABLE 7 Model comparison using information criteria.

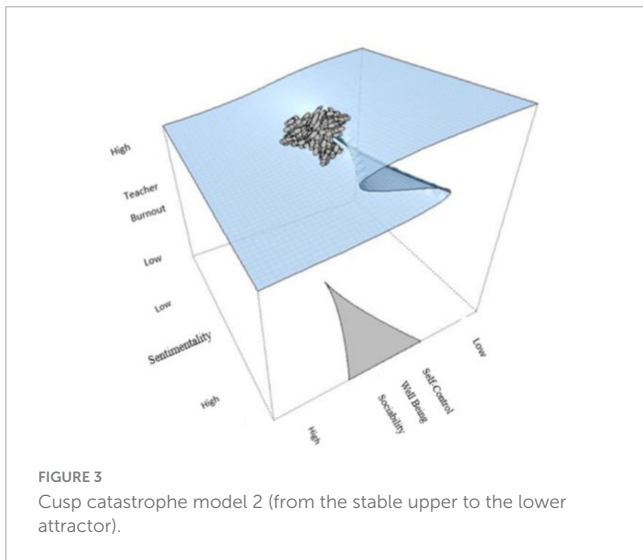| Model	Akaike criterion (AIC)	Akaike criterion corrected (AIC$_c$)	Bayesian information criterion (BIC)	Loglikelihood	Number of estimated parameters
Linear	6321.21	6323.25	6368.34	−3126.13	10
Logistic	6235.17	6235.21	6271.02	−3078.07	11
Cusp	5028.02	5028.34	5123.19	−2987.12	12

FIGURE 3
Cusp catastrophe model 2 (from the stable upper to the lower attractor).

to the quadratic and the linear models. Based on the analysis, EI had a significant influence on burnout among special education teachers in Greece. Specifically, EI was negatively correlated with burnout. However, when EI increased beyond a certain point, burnout unexpectedly increased. The cusp catastrophe model best describes this phenomenon.

EI is considered a protective factor against burnout. Many studies have confirmed that as teachers develop their EI, the possibility of developing burnout decreases (Martínez-Monteagudo et al., 2019; Mérida-López and Extremera, 2017; Zysberg et al., 2017). This negative correlation was noted in this study, too. However, our study found that the relationship between EI and burnout was not linear. The cusp catastrophe model indicated a crucial point where an EI increase led to a burnout increase instead of a decrease. This could indicate that, in a way, teachers had reversed the beneficial effect of EI on burnout.

Though high EI can usually help people handle emotions and interpersonal relationships, it is not immune to causing stress due to excessive empathy (Davis and Nichols, 2016). Sentimentality had a significant effect on special education teachers' burnout, as shown by the cusp model analysis. Sentimentality expresses the ability of people to understand their own and others' feelings, to express emotions, and to use emotions to build and maintain close relationships (Petrides and Furnham, 2001). However, it is very difficult for teachers to constantly manage contradictory emotions, experience empathetic distress and sentimental tiredness, or even role conflict, in demanding or stressful environments such as special education classes (Bianchi et al., 2021; Wink et al., 2021). This means that these teachers might be so attached emotionally and mentally to students that they overextend themselves thereby developing burnout over time. Emotionally perceptive people can be more strongly affected by stress (Ciarrochi et al., 2002). Striking
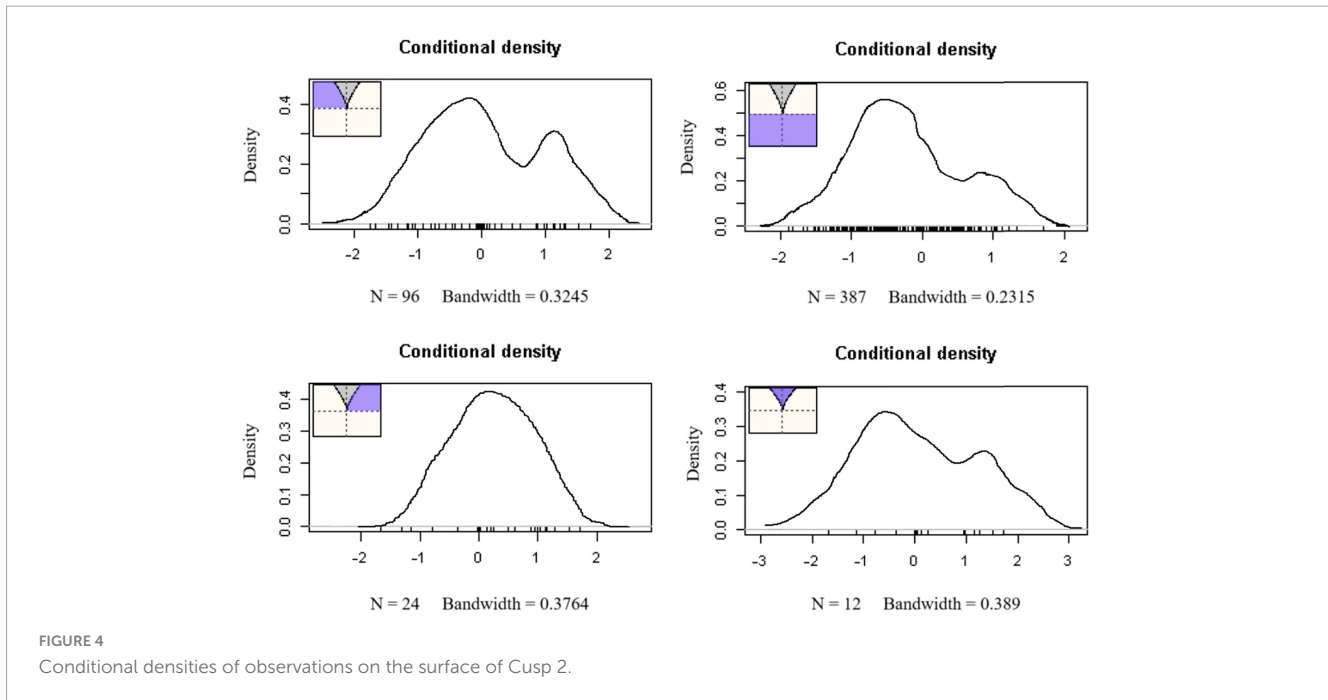
FIGURE 4
Conditional densities of observations on the surface of Cusp 2.

TABLE 8 Parameter estimates of the cusp model 2 for the prediction of teacher burnout.

Terms in cusp model 2	b	CI b95% Low	CI b95% High	SE	Z-value	p-value
a: Intercept of asymmetry variables	−0.205	−0.309	−0.101	0.107	−12.117	0.021
a_1: Self-control	−0.298	−0.381	−0.215	0.031	−13.456	0.014
a_2: Wellbeing	−0.105	−0.142	−0.068	0.052	−1.002	0.009
a_3: Sociability	−0.301	−0.418	−0.184	0.022	−16.714	0.013
b: Intercept of bifurcation variable	−0.284	−0.305	−0.326	0.082	−14.221	0.031
b: Sentimentality	−0.359	−0.414	−0.304	0.041	−18.978	0.005
w: Intercept of outcome variable	−0.276	−0.317	−0.235	0.054	−13.216	0.027
w: Teacher burnout	0.675	0.513	0.837	0.013	78.216	0.003

TABLE 9 Model comparison using information criteria.

Model	Akaike criterion (AIC)	Akaike criterion corrected (AIC$_c$)	Bayesian information criterion (BIC)	Loglikelihood	Number of estimated parameters
Linear	5749.13	5749.17	5813.11	−2915.04	6
Logistic	5124.19	5124.24	5205.13	−2865.12	7
Cusp	4116.04	4116.16	4312.07	−2746.04	8

a balance between empathy and self-care is essential for preventing burnout.

As to the other findings of the study, all hypotheses were confirmed. As hypothesized, teachers' self-efficacy correlated negatively to burnout. This is a common finding in research, as teachers who believe in their abilities are protected against burnout (Skaalvik and Skaalvik, 2010). Another factor that had a negative relationship with burnout, was mental resilience. That was also a finding that is often noted in the literature (Burić et al., 2019; De Vera and Gabar, 2020). Resilient teachers find the means to compress job stressors, overcome difficulties, and find solutions (Kangas-Dick and O'Shaughnessy, 2020).

A contradiction in the results was noted between teaching experience, age, and burnout. Teaching experience had a positive impact on burnout, suggesting that experienced teachers could develop a greater level of burnout in comparison to novice ones. This may seem contradictory to the fact that, according to the results, teachers' age was negatively correlated to burnout. One can assume that older teachers have more teaching experience than younger ones. Although this seems like a paradox, there is an explanation. In Greece, teachers' age doesn't always go along with teaching experience. Many teachers are appointed to schools at an advanced age, after having experienced periods of unemployment or reduced employment as substitutes. However,

teaching experience and age have been both negatively and positively associated with burnout, in research (Antoniou et al., 2006; Bianchi et al., 2021; Maslach et al., 2001).

Conclusion

Special education settings require teachers to manage unexpected situations and face emotional difficulties. EI offers a means of handling stress and promoting resilience (Begum et al., 2024). Teachers with high levels of EI can identify emotional triggers as well as find constructive ways of managing emotions that benefit learners. If one develops the necessary coping skills, positive mechanisms can neutralize stress's negative effects. The cusp catastrophe model, in the current research, demonstrated that there is a fragile balance between caring and caring too much. Teachers could benefit from educational programs that help them to develop emotional intelligence skills in a way that they improve the recognition and regulation of emotions and do not allow over-whelming or empathetic distress.

Practical implications

In-service programs for teachers could include training in EI. This training can be used to help teachers develop their self-awareness and control, empathy, and effective communication skills, which are all main parts of emotional intelligence (Pozo-Rico et al., 2023). Special education teachers with high EI can be more aware of their stress levels, understand their students' emotions, and adopt strategies that would help them deal with stressful situations appropriately. They also could learn to regulate sentimentality and not let themselves be overwhelmed by emotions.

Support against stress can also come from family, peer groups, and school administration. Schools may implement wellness initiatives built on principles of EI with a focus on promoting a self-care culture among teachers. It can include strategies for self-control, stress management as well as resilience that may be obtained by a teacher. In schools where self-care is valued and supported, burnout can be prevented, thereby ensuring the teacher's overall wellbeing.

Data availability statement

The datasets presented in this article are not readily available because the project has not been completed yet. Requests to access the datasets should be directed to charitaki.garyfalia@ac.eap.gr.

Ethics statement

The studies involving humans were approved by the National and Kapodistrian University of Athens. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

A-SA: Writing – original draft, Writing – review & editing. GC: Writing – original draft, Writing – review & editing. KP: Writing – original draft, Writing – review & editing. AA: Writing – original draft, Writing – review & editing.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer JV declared a shared affiliation with the author AA to the handling editor at the time of review.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2025.1512197/full#supplementary-material

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