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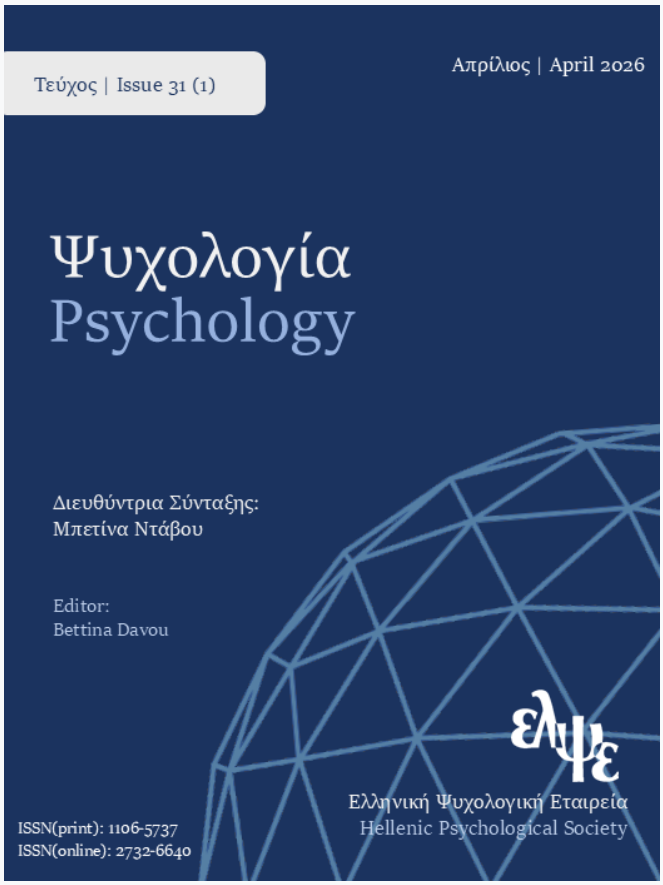

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ΕΜΠΕΙΡΙΚΗ ΕΡΓΑΣΙΑ | RESEARCH PAPER *(κάντε κλικ στο κείμενο και επιλέξτε το κατάλληλο)*

The development of mathematics anxiety as a process of appraisal

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KEYWORDS

Life events
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Prospective primary teachers

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ABSTRACT

Research on the coping strategies that prospective primary teachers (PPTs) employ when facing stressful life events (LEs) related to mathematics remains limited, and current models of mathematics anxiety do not sufficiently explain how such events—when appraised as negative—contribute to its development. This mixed-methods study is theoretically grounded in the *interpretation account*, a framework that highlights the role of individuals' internal narratives and cognitive appraisals in shaping their emotional responses to mathematics. Qualitative data were collected through semi-structured interviews with 24 PPTs and analysed by using thematic qualitative text analysis to identify common types of LEs and coping strategies. The quantitative component involved descriptive statistical analysis of the frequency and distribution of these strategies across educational levels and in relation to when the LEs occurred. Findings showed that most LEs were associated with instructors' pedagogical approaches or in-class behaviours, and with the perceived difficulty of mathematics. Participants predominantly used problem-focused coping strategies (e.g., instrumental support, active coping, planning), but also employed less adaptive ones—such as behavioural disengagement—which were reported across all educational stages, often in close temporal proximity to the LEs themselves, and more frequently during tertiary education. The study concludes by proposing targeted interventions that support PPTs in adopting adaptive coping strategies and in gradually reconstructing disfluent narrative identities formed through negative mathematics experiences.

Mathematics anxiety is a construct referring to the emotion of fear and tension a person experiences while engaged in a mathematical activity which leads to a disrupt in the manipulation of numbers or solving a mathematical problem (Ashcraft, 2002; Richardson & Suinn, 1972). In the case of prospective primary teachers (PPTs), relevant research has demonstrated strong links between mathematics anxiety and the negative events experienced by PPTs themselves while they were students (e.g., García González & Sierra, 2020; Jackson & Leffingwell, 1999; Lutovac & Kaasila, 2022). Although researchers do not seem to agree about the prevalence of mathematics anxiety among PPTs (Artemenko et al., 2021), primary teachers are still the educators responsible for introducing children to formal mathematics and as such, their role in a child's development in mathematics is crucial.

The negative effects of a primary teacher's mathematics anxiety have been highlighted by several empirical studies during the last three decades; for example, a teacher's negative apprehension of mathematics may trigger student mathematics anxiety (Hembree, 1990), cause mathematics avoidance (Jaggernauth & Jameson-Charles, 2015), instil gender-stereotyped beliefs to their students (Beilock et al., 2010) or negatively affect mathematics performance (Ramirez et al., 2018). Primary teachers with mathematics anxiety also tend to teach in a very traditional manner, emphasizing memorization of basic formulas and algorithms, a practice which may cause unintentionally mathematics anxiety (Trujillo & Hadfield, 1999). Thus, if PPTs have developed mathematics

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anxiety at some point in the past, there is a very good chance of behaving and teaching in ways that may cause mathematics anxiety to their own students, forming in this way a mathematics anxiety cycle (Bekdemir, 2010).

Mathematics anxiety life events and coping strategies

Models of mathematics anxiety and the interpretation account. During the last 60 years, numerous models focusing on the causes of mathematics anxiety have been proposed (Dowker et al., 2016). Although research about when and how mathematics anxiety begins has not offered conclusive answers yet (Cipora et al., 2022), theories aiming at explaining the development of mathematics anxiety can be organised into six broad categories, with each one of them treating mathematics anxiety as the result of (Ashcraft, 2019; Dowker et al., 2016; Ramirez et al., 2018): difficulties in numerical and spatial processing (Ma & Xu, 2004); personality characteristics pertaining to self-confidence, motivation, general anxiety or test anxiety (Hembree, 1990); cognitive factors disrupting the working memory (Trezise & Reeve, 2014); socioenvironmental factors related to math-related experiences with parents (Maloney et al., 2015) or negative in-class experiences with teachers (Jackson & Leffingwell, 1999); gender (Hopko et al., 2003) and; genetic predispositions (Wang et al., 2014).

A recent development in the ways researchers view mathematics anxiety is Ramirez et al.'s (2018) interpretation account, a framework which has its origins in the cognitive appraisal theory (Lazarus, 1991) and the attitude-as-construction view (Wilson et al., 2000). According to the interpretation account, students' interpretation of past experiences and outcomes determines whether they will develop or not mathematics anxiety. Evidence for this view includes studies demonstrating that students' interpretation is the strongest predictor of mathematics anxiety in more than one ways: for example, children who interpret their mathematics performance as an indicator of their abilities develop mathematics anxiety (Meece et al., 1990); lower levels of self-concept (perceptions of one's self in relation to mathematics) negatively affect students' appraisal of their ability to do well in mathematics and can predict mathematics anxiety (Ahmed et al., 2012) and; students who have a lower perception of personal competence cannot easily overcome previous difficulties with mathematics (Jain & Dowson, 2009).

A major tenet of the interpretation account is the view that students have an active role in the process of creating meaning of their experiences by "seeing the world through an interpretative lens that is shaped by an internal narrative" (Ramirez et al., 2018, p.153). This has several implications about the function of internal narratives. In particular, internal narratives are used by students in order to (Ramirez et al., 2018): better understand both themselves and past math experiences; gain a sense of stability, unity, and purpose, and maintain an overarching account of their self-adequacy. This means that students who do not adapt their disfluent internal narrative towards mathematics, view past, ongoing and future events as being consistent with the narrative they choose to tell. According to Ramirez et al. (2018), students' appraisals may be heavily shaped by social factors such as: existing cultural stereotypes (e.g., "women hate math, so I must hate math as well"); societal beliefs around disfluent learning (e.g., "if you are having trouble learning something, then you are probably not going to perform very well"); social interactions in home (e.g., "my parents always help me with math homework because I am not very comfortable doing it on my own"); in-class social interactions (e.g., "my teacher gets really stressed out teaching math"); teaching pedagogy (e.g., "my teacher doesn't ask us questions or encourage us to think deeply about math because he/she believes that not everyone can be good at math") and; common beliefs about the meaning of heightened physiological arousal (e.g., "my heart is beating fast, I must be really nervous").

Importantly, this model converges with findings from recent research emphasizing the emotional and biographical roots of mathematics anxiety. For example, Jenßen et al. (2022) provide compelling evidence of the affective origins of mathematics avoidance, particularly the role of shame experienced throughout schooling. In their mixed-method study of pre-service primary teachers, they found that most individuals who had disengaged

from mathematics had experienced repeated episodes of shame concerning their competence or understanding in mathematics during primary and secondary education. Their findings show that shame functions both as an emotional reaction and as a narrative structure, shaping how individuals recall, interpret, and assign meaning to prior learning experiences. This aligns with theories of narrative identity, wherein emotionally charged memories play a central role in shaping one's self-perception and life trajectory. For many participants, avoiding mathematics at the university level was not merely a rational decision but a deeply emotional act of self-preservation, aimed at avoiding the repetition of past feelings of inadequacy and humiliation. By emphasizing how internal narratives mediate the interpretation of mathematical experiences, Jenßen et al.'s work not only supports but deepens the theoretical claims of the interpretation account. It brings attention to the long-term emotional consequences of early mathematical experiences and the way these are internalized as part of a broader self-concept. These insights underscore the need for teacher education programs to recognize and address these emotional narratives. Supporting prospective teachers in reframing their mathematical histories is essential not only for their own confidence and competence, but also for breaking the intergenerational cycle of mathematics anxiety.

Cognitive appraisal theory. The interpretation of an event holds a central position in Ramirez et al.'s (2018) framework; in appraisal theory, the process of interpreting an event, refers to appraisal, the cognitive activity of how an individual perceives events and evaluates the resources available to cope with them, if necessary (Lazarus, 1991). Appraisal takes place in cycles -primary and secondary- with each cycle providing an increasingly deeper interpretation of the experienced event (Figure 1). In primary appraisal, the individual initially assesses whether an event is neutral, negative, or positive. If the event is appraised as being neutral or positive, then no heightened physiological arousal occurs, and the event is not perceived as stressful. On the other hand, if the event is appraised as negative, the individual will proceed in making a secondary appraisal (Campbell et al., 2013). In secondary appraisal, the individual simultaneously evaluates the availability of resources and information for resolving the situation, and possible changes in the primary appraisal as a means for adapting and finding solutions (Power & Dalgleish, 2016). Primary and secondary appraisals work in conjunction with each other and allow the individual to determine whether her/his interaction with the environment is significant, and if so, whether it is threatening i.e., involving a possibility of harm or loss or, challenging i.e., involving a possibility of mastery or benefit (Folkman et al., 1986). The appraisal of an event occurs multiple times; subsequent appraisals of the same event are called reappraisal, a process that plays a vital role in determining an individual's reaction to an event (Lazarus, 1991).

Life Events. Events which result "[a]n acute change to roles, relationships, routines or material or health circumstances as part of the social or physical environment" (Bifulco et al., 2021, p.25) are called life events (LEs). Since the mid-1980s, psychologists and educational psychologists have proposed various conceptualizations of the ways LEs can be classified. Depending on the criterion used, LEs are found on a spectrum pertaining to an LE's duration (acute vs chronic; e.g., Compas, 1987), an LE's impact (major vs minor; e.g., Luhmann et al., 2021), the impact's duration (transients vs enduring; e.g., Sheldon & Lyubomirsky, 2012) or a mix of an LE's impact and its impact duration (critical vs daily hassles; e.g., Alder, 2005).

Coping Strategies. Among the most widely used conceptualizations of coping in the literature (both at a conceptual level and as an instrument for measuring coping) are those by Folkman and Lazarus (1985) and Carver et al., (1989) (Table 1). Folkman and Lazarus (1985) explored secondary appraisal processes in depth and argued that they can be divided into three main categories: problem-focused (PFC), emotion-focused coping (EFC) and mixed coping. PFC is used when the individual believes that the problem can be solved, and thus, the distress experienced could be reduced. When employing a PFC strategy, an individual tries to analyse a problem and understand it or to make a plan to solve an issue and follow it. On the other hand, in EFC the focus shifts on

managing the resulted emotional situation. EFC includes strategies such as denial, focusing on and venting of emotions, positive reinterpretation of events, seeking social support, minimizing threat, wishful thinking, and self-blame. Finally, mixed coping refers to seeking social support which according to Folkman and Lazarus (1985) include both problem- (e.g., talking to a person to find out more about a situation) and emotion-focussed strategies (e.g., accepting sympathy and understanding).

Figure 1: *Appraisal cycles and reappraisal*

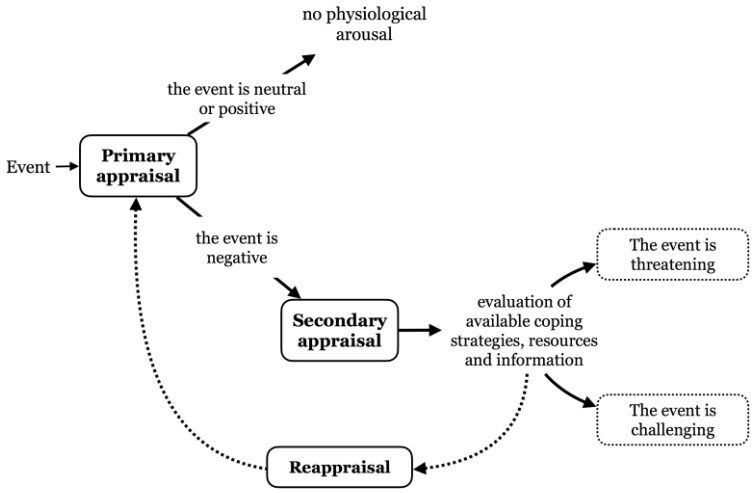


Table 1. *Coping strategies according to Folkman and Lazarus (1985) and Carver et al. (1989)*

Folkman and Lazarus' categorisation	Carver et al.'s categorisation
Problem-focused coping strategies (PFC)	*Problem-focused coping strategies (PFC)*
active coping	active coping
active planning	active planning
	suppression of competing activities
	restrain coping
	seeking social support for instrumental reasons
Emotion-focused coping strategies (EFC)	*Emotion-focused coping strategies (EFC)*
wishful thinking	seeking social support for emotional reasons
distancing	positive reinterpretation
emphasising the positive	acceptance
self-blame	denial
tension reduction	turning to religion
self-isolation	
Mixed coping strategies	*Less useful coping strategies*
seeking social support	focusing on and vending of emotions
	behavioural disengagement
	mental disengagement
	self-blaming

The coping models proposed by Folkman and Lazarus (1985) and Carver et al. (1989) are based on the same fundamental structure and distinguish between problem-focused coping (PFC) and emotion-focused coping (EFC). Both models include strategies such as active coping and planning under PFC and positive reinterpretation and denial under EFC. They also recognize the role of social support, though Folkman and Lazarus treat it as a

mixed strategy, whereas Carver et al. categorize it as either emotional or instrumental. However, the models differ in scope and classification. Carver et al. introduce a third category of 'less useful coping strategies', which includes behaviours such as disengagement and venting. These are not clearly addressed by Folkman and Lazarus. Furthermore, Carver's model explicitly evaluates the effectiveness of strategies and includes turning to religion, whereas Folkman and Lazarus adopt a more neutral, descriptive approach based on cognitive appraisal theory. Despite these differences, both models offer valuable insights into how individuals manage stress. In conclusion, both models contribute valuable insights into coping theory. Folkman and Lazarus provide a cognitive framework that emphasizes the dynamic appraisal of stress and coping. Carver et al. build upon this by offering a more detailed and practical inventory of strategies that allows for the clearer identification of adaptive and maladaptive responses. Together, these models offer complementary perspectives that enhance our understanding of how individuals manage stress.

Stressful life events and coping strategies among prospective primary teachers. Since the late 1990s several empirical studies have explored the stressful LEs experienced by PPTs while they were students themselves. Among the earliest investigations in this area is the work of Jackson and Leffingwell (1999) who identified LEs pertaining to the difficulty of the material taught (e.g., hard to understand certain mathematical concepts or procedures) and an instructor's exhibited behaviour (e.g., being hostile, angry, uncaring, showing signs of gender bias) or teaching quality (e.g., exams not aligned with the material taught, providing poor explanations). Similar findings and conceptualisations have been reported by more recent studies. For example, Bekdemir (2010) and Öçal (2021) identified LEs related to a teacher's behaviour (e.g., physical and verbal interactions which make students feel uncomfortable or insecure, being authoritarian, not having class management skills); a teacher's knowledge and pedagogy (e.g., poor knowledge of mathematics and/or teaching skills); a student's personal qualities and characteristics (e.g., having low self-confidence, not being motivated); a student's attitudes and insufficiencies (being negatively biased towards mathematics, having a weak understanding of mathematics); the school and surrounding context (e.g., experiencing peer pressure due to a competitive school environment, experiencing anxiety due to parental pressure and changes in circumstances) and; difficulties of the material taught (e.g., finding difficult to grasp certain mathematical concepts).

Although mathematics anxiety among PPTs is an issue that has concerned researchers (Artemenko et al., 2021), little is known about the coping strategies PPTs employ when faced with mathematics-related stressful LEs. Previous studies on (either primary or secondary) prospective teachers' coping strategies have focussed on the mechanisms developed when being stressed about their academic achievement (Gustems-Carnicer et al., 2019); teaching in economically disadvantaged and socially challenging contexts (Kelly et al., 2015); experiencing bullying and cyberbullying in school contexts (de las Heras et al., 2022); facing and resolving conflicts with their students (Borremans & Spilt, 2022); dealing with socially constructed gendered roles in schools (Cruickshank et al., 2021); developing their professional identity (Pillen et al., 2013) or resolving feelings of inadequacy during their training (Lindqvist et al., 2017).

Studies exploring affective issues in mathematics education, concern the negative emotions experienced by PPTs during their school or undergraduate days but not all of them are specific to mathematics, nor do they concentrate on coping strategies. For example, several investigations have focussed on identifying different styles of coping with boredom (Daniels et al., 2015) or the role of boredom coping strategies in relation to PPTs' cognitive, behavioural, and emotional engagement with a course (Eren, 2016). Jenßen and colleagues (Jenßen et al., 2020; Jenßen et al., 2022) explored the frequency and intensity of shame, anger sadness, boredom, and helplessness in mathematics during their primary and secondary school years, without however identifying the kinds of copying strategies employed by PPTs.

Cruickshank et al. (2021) investigated the gender-related challenges faced by male pre-service primary teachers and the strategies they use to cope with these pressures. While their work focuses on gender, the

psychological mechanisms they describe, particularly stress management, social isolation and perceived role incongruence, are similar to those experienced by people with mathematics anxiety. Their participants reported using both functional strategies, such as seeking social support, reframing challenges, and developing resilience through reflective practice, as well as dysfunctional strategies including withdrawal and avoidance behaviours. The parallels with mathematics anxiety are noteworthy. Just as pre-service male teachers may disengage from certain classroom activities to avoid situations that might invite gender-based scrutiny, prospective teachers anxious about mathematics may similarly retreat from mathematical engagement to evade situations that could trigger feelings of incompetence or public embarrassment. In both contexts, the emotional burden of perceived judgement appears to influence coping behaviour. Cruickshank et al. emphasize the importance of proactive coping training in teacher preparation programs, advocating for structured opportunities to develop self-efficacy and peer support networks. Applying this insight to mathematics anxiety suggests that incorporating emotion-focused coping strategies, such as normalizing struggle, reframing mistakes as learning opportunities and encouraging collaborative problem-solving, could effectively reduce avoidance behaviours and foster mathematical confidence among teacher trainees.

More recently, a number of studies have explored prospective teachers' coping mechanisms when faced with stressful LEs in mathematics; these include the works of García González and Sierra (2020), Stoehr (2017) and, Stoehr and Olson (2023). García González and Sierra (2020) present a case study of "Diego," a prospective secondary teacher who overcame severe mathematics anxiety through a two-year cognitive coaching process. His anxiety stemmed from early experiences of failure and unsupportive teaching, which shaped a negative self-narrative around mathematics. The study highlights how supportive mentors, low-pressure engagement with mathematics, and reflective practice helped Diego reframe his difficulties as challenges rather than fixed deficits. Although specific coping strategies are not detailed, the authors identify three key elements in relieving his anxiety: recognizing anxiety triggers, implementing strategies to address them, and ensuring emotional support. This case underscores the importance of narrative reconstruction and targeted support in helping pre-service teachers transform their relationship with mathematics.

Stoehr (2017) focused on the autobiographical story of Estelle, a PPT who had experienced intense dislike and fear of mathematics at school. By adopting a narrative approach, Stoehr analysed how Estelle's experiences with mathematics were fraught wit anxiety, something that, led to the development of a specific coping strategy. This strategy incorporated the creation of an imaginary "wall" which was perceived to act as barrier offering protection and relief from Estelle's poor performance and anxiety with mathematics.

Stoehr and Olson's study (2023) identified eight types of coping strategies that a group of 48 PPTs envisioned utilizing in the future if confronted with mathematics anxiety while teaching. These included: turning to a trusted colleague; finding an online resource (e.g., a recorded video lesson); being prepared (i.e., carefully prepare and organize an upcoming lesson); sharing and shifting the teaching responsibility with students (e.g., invite students to share their understanding with the class); understanding the mathematics content to be taught; being honest with students (i.e., communicating to students when feeling unsure about mathematics); being kind to themselves (e.g., not expecting to be perfect, accepting mistakes) and; using the mathematics curriculum guide (i.e., the teacher's manual).

Collectively, studies focussing on PPTs' stressful LEs with mathematics suggest that LEs are related to: the difficulty of mathematics as a subject; an instructor's behaviour or pedagogical approach; a student's personality type or insufficiency in mathematics; the class environment and; a student's wider social environment. In relation to coping strategies, the literature is quite thin and does not adequately inform us about the ways PPTs cope when experiencing stressful LEs, an observation made by recent studies as well (Stoehr & Olson, 2023). Finally, to our best knowledge, the interpretation account has not been applied in studying the development of mathematics anxiety as an appraisal process, an inquiry which has the potential to explain why negative

experiences with mathematics lead to mathematics anxiety, something that current approach fail (Ramirez et al., 2018).

The aim of this study is to explore how prospective primary teachers (PPTs) experience and interpret mathematics-related stressful life events, and how these interpretations may contribute to the development of mathematics anxiety, through the lens of the interpretation account. Thus, this study aims answering the following questions:

1. What kind(s) of stressful LEs do PPTs experience throughout their formal education?
2. What kind(s) of coping strategies do they employ when experiencing these LEs?
3. How does the interpretation of mathematics-related LEs relate to the development of mathematics anxiety?

Method

The present mixed methods study followed a monostrand conversion design (Teddlie & Tashakkori, 2009). The data were gathered by conducting 24 in-depth interviews with PPTs from one primary education department in Greece. The interview protocol (Table 2) included open-ended questions which aimed at eliciting answers related to three topics: participants' stressful LEs, their emotions while experiencing these events and strategies employed for coping with them. The study's qualitative component included qualitative text analysis of the interview data whereas, the quantitative component incorporated the conversion of the interview data into quantitative data (frequencies for LEs and coping strategies).

Table 2. *The interview protocol. All items are translated from Greek*

Topic	Questions
Stressful life events and difficulties with mathematics	How would you describe your relationship with Mathematics?
	What kind of difficulties did you encounter in school?
	What kind of difficulties have you encountered so far at the university?
	Can you recall any particular event?
Emotions	How did you feel when this happened?
	What were your thoughts when this happened?
Coping strategies	Did you try to overcome these difficulties? How?

Context

The Bachelor's duration in the department is four years and offers modules in six main areas: theory of education and curricula; educational psychology; research methodology; teaching methodology; educational technology and; STEM education. The mathematics modules include topics in Primary Mathematics Education (e.g., strategies for addition and subtraction; ratios, proportions and proportional thinking), Geometry (e.g., points, lines, planes, axioms, area and volume measurement), Algebra (e.g., equations; functions; basic set theory), Number Theory (e.g., natural numbers; Peano axioms; prime numbers) and, Probabilities and Statistics (e.g., descriptive statistics; classical, frequentist and subjective meaning of probability; Law of large numbers). In order to graduate, students must successfully attend at least three modules in mathematics. During their fourth year, undergraduates have their two-part school practicum, (one for each academic semester) throughout which they practice teaching across all subjects.

Study participants and recruitment process

Initially, a list of 60 potential participants from the department's undergraduate population was compiled. The list included undergraduates who had attended at least two modules in mathematics and had preferably started or completed the first part of their practicum. The undergraduates were invited via email and in total 24 of them agreed to participate (92% female, average age: 21.2 years, average year of studies: 3.5 years, 40% response rate). One participant (participant 23) was selected on the basis of being a typical case of a PPT who developed a specific internal narrative due to her experiences throughout her education (purposive sampling). No incentives or other forms of compensation were provided to undergraduates for their participation.

Data collection and ethics

The project associated with the present study was funded by the University of XXX Research Funding Committee. Prior to collecting data, an ethical clearance checklist was submitted and approved by the University's Research Ethics Committee (decision number: 27/24.02.2022). An informed consent in accordance with the Declaration of Helsinki was obtained from all participants. The in-depth interviews were semi-structured and were conducted during the spring term of 2022 (31/3-16/5). To avoid possible complications due to the ongoing pandemic, all interviews were undertaken via video conferencing software (Zoom). Each interview lasted between 30 and 60 minutes (average time: 40 minutes). At the beginning of each session, participants were informed about the practicalities of the overall procedure (interview being audio recorded with the camera turned off) and they were reassured of confidentiality and anonymity. After this, they were invited to carefully read and digitally sign the consent form. During the interviews it was emphasized to participants that they could refuse answering a question or withdraw at any time if feeling uncomfortable. In building a trustful relationship with the interviewees and, thus enabling them to feel comfortable and speak freely, the aspect of anonymity and confidentiality was repeated several times during each interview.

The question inviting undergraduates to describe their relationship with mathematics (Table 2: "How would you describe your relationship with mathematics?") was initially designed to be used as an "ice breaker", however, it proved to be the question enabling participants to describe more clearly their developmental path in mathematics and better recall LEs; thus, in subsequent sessions the interview was structured around this question. Given the semi-structured nature of the sessions, throughout each interview, the interviewer used various prompting and probing questions in order to explore interesting and important issues raised by the participants (e.g., "Can you elaborate more on this?"). Interviews were transcribed by using the transcription tool of MAXQDA 2020 (VERBI Software, 2020).

Analysis

Prior to analysis, all interviews were transcribed verbatim and entered as text in the qualitative analysis software MAXQDA2020. After the transcription, audio files from each interview were then destroyed and any reference to participants' or other people's identities mentioned in the interviews were removed. Participants were assigned with alphanumeric codes (S01, S02, S03 etc.) representing each interview's order. Other people's names mentioned in the interviews were replaced with a unique, random letter (e.g., [L]). Notes made during fieldwork, transcription and initial analysis were entered as memos in MAXQDA2020 as a way of facilitating reflection and analytical insight (Maxwell, 2013). In conducting a credible account of the findings, the authors analysed data both independently and collaboratively, kept an electronic reflective journal and created memos for documenting their thoughts and tracking the evolution of analysis.

Data analysis took place in three major stages. During the first stage, interviews were analysed by using thematic qualitative text analysis, an approach that has many similarities with other methods such as thematic

analysis (e.g., Braun & Clarke, 2006) and qualitative content analysis (e.g., Schreier, 2012). Following Kuckartz (2014), the analysis was carried out in seven phases:

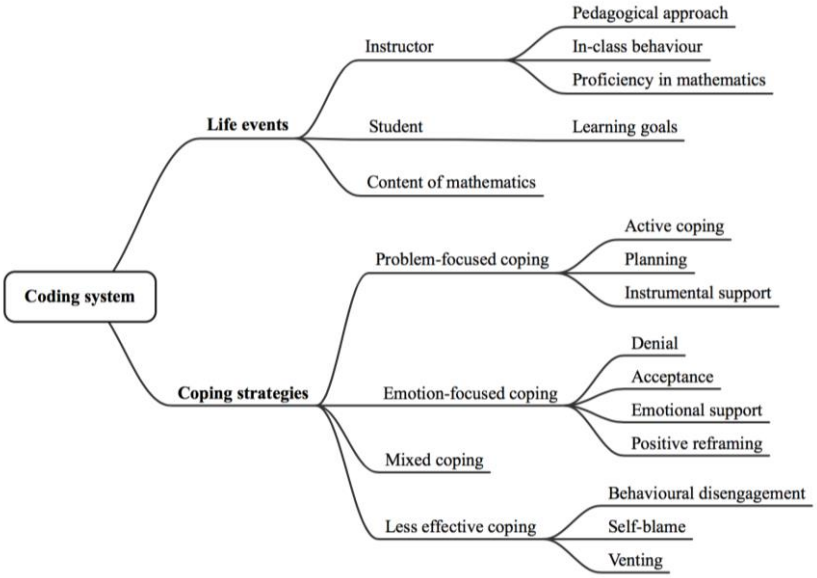
1. Initial work: familiarisation with the data; highlighting important passages; creating memos;
2. Development of initial coding system: categories and subcategories for the LEs were based on the literature from section 3; categories and subcategories for the coping strategies were based on the literature from section 2.4 (Table 3); categories and subcategories for LEs were created in a data driven manner.
3. Initial coding: independent coding round; coding of passages referring to LEs that PPTs considered to be stressful; coding of passages referring to coping strategies that PPTs employed while experiencing a particular LE or other difficulties;
4. Discussion of initial coding: comparison of coding results; creating a more elaborate version of the definitions and rules followed while coding;
5. Compiling: passages belonging to LEs and coping strategies were gathered; subcategories across each category were checked for consistency; developing the final version of the coding system (Figure 2);
6. Main coding: collaborative coding round; coding all relevant material;
7. Category-based analyses: creating summaries for the LEs and coping strategies; choosing a representative case, creating a case overview for participant S23.

During the second stage, the categories and subcategories for LEs and coping strategies were quantified by calculating their frequencies and distribution across educational levels i.e., when the LE was experienced or when the coping strategy was employed (e.g., when the PPT was at primary school, junior/high school or at the university). Finally, an in depth analysis of participant 23 (assigned with the pseudonym Sophia) was carried out.

Table 3. *Categories and sub-categories for coping strategies*

Coping categories	**Coping sub-categories**
Problem-focused coping	Active coping: taking active steps, trying to address in a direct way a stressful event or its effects. Planning: thinking about how to cope with a stressor. It involves coming up with action strategies, thinking about what steps to take and how best to handle the problem. Instrumental support: seeking advice, assistance or information from another person.
Emotion-focused coping	Denial: refusing to believe that the stressor exists, trying to push the reality of a stressful situation away. Acceptance: accepting the reality of a stressful situation. The opposite of denial. Emotional support: Getting moral support, sympathy or understanding. Positive reframing: interpreting a stressful situation in positive terms.
Less effective coping	Behavioural disengagement: reducing efforts to deal with a stressful event, giving up the attempt to attain goals with which the stressor is interfering. Self-blame: criticizing oneself for having the responsibility in a stressful situation. Venting: the tendency of focusing on the experienced stressful event and ventilating the experienced feelings.
Mixed support	Mixed support: seeking instrumental and emotional support.

Figure 2 *Final version of the coding system*



Findings

Life events

The LEs identified in the interview data were organised into five sub-categories (Table 4). These were related to: (a) an educator's pedagogical approach e.g., instructional strategies and methods used, providing or not feedback to students and no class control; (b) an educator's in-class behaviour; (b) a primary teacher's proficiency in mathematics; (c) changes in participants' learning goals e.g., shifting from understanding as a student to understanding as a future teacher and; (d) the content of mathematics e.g., issues participants experienced as students while trying to comprehend mathematics.

By taking into account the period that a stressful event was experienced, LEs were organised in three categories, each corresponding to LEs that took place during a participant's primary, secondary and tertiary education years (Table 5). As we can see from Table 5, some LEs occurred at all educational levels (pedagogical approach, in-class behaviour, content of mathematics) whereas others, were found to be distinct at certain levels: proficiency in mathematics was reported for only primary teachers and changes in learning goals were experienced only at the university. In addition, some LEs related to an educator's pedagogical approach (not shown in Table 5) were identified at certain educational levels only: these pertain to stressful LEs caused by feedback provided to a student (n=2, secondary), losing control of the class (n=3, secondary) or disregarding a student's alternative solution to a problem (n=1, secondary; n=2, tertiary).

Coping strategies

When faced with the above described LEs, participants reported using the following coping strategies (Table 6): (a) instrumental support e.g., seeking help from people close to a PPTs' social network, such as parents, siblings or a private tutor; (b) active coping e.g., searching for online videos or studying additional textbooks; (c) venting e.g., getting upset and vocally expressing negative feelings; (d) planning e.g., organizing a week's study or carefully preparing teaching activities for the practicum; (e) behavioural disengagement e.g., giving up efforts in resolving issues with mathematics; (f) mixed support e.g., seeking both instrumental and emotional support; (g) self-blame e.g., considering personal actions and behaviour responsible for not being able to cope with an LE; (h) acceptance e.g., getting used to the idea of being "bad" in mathematics; (i) positive reframing e.g., reinterpreting

an LE based on knowledge gained from a previous experience; (j) emotional support e.g., seeking sympathy and understanding from a person and; (k) denial e.g., refusing to believe that mathematics exist.

Table 4, *Frequencies (number of events) and representative excerpts for life events*

Life event	Frequency	Interview excerpt
Pedagogical approach	35	…the teacher asked a question, something very easy, like "5 plus 4 equals?"… She asked a student sitting across from me… he couldn't answer so, I showed him the answer with my fingers, something like that, I told him the answer without wanting the teacher to see me… the other kids told her that I showed him the answer… when it was my turn, she yelled at me saying "it's not right to talk when I'm asking others" and I was the only one who was called to answer while standing in front of the blackboard… the teacher waited for me to answer… I was stuck, I was stressed… and she told me something like "this is a lesson for you, we do not give answers to others if we are not in the position to answer them ourselves"… I sat afterwards… and… I felt very bad emotionally… (S20)
Content of mathematics	17	the [mathematics] modules at the university were not all at the same level, some were more difficult, some easier… the theory and proofs in mathematics, I could see that I was doing better because… I could memorize them better … easier, with the exercises yes, I needed a lot of effort to be able to solve them and understand them… […] and… it helped me a lot to attend, to go at the lectures… […] I needed a lot of effort and the result was average in some modules… (S01).
In-class behaviour	16	Since the first grade I had a teacher who was very anxious and she made all students feel anxious… it was not a personal matter… and… all this put too much pressure on me and I could not perform well in general, not only in mathematics, but in mathematics a little bit more, I think the subject is also more special, with operations etc. […] she was intense in general, she shouted a lot, so that didn't help me either, it affected me very negatively… […] she shouted a lot and for the slightest thing she would raise her voice… (S20)
Proficiency in mathematics	5	…in the fifth and the sixth grade… the teacher had a lot of issues with mathematics… that is, she made mistakes in the exercises… many times some things were… my parents saw that she was teaching us in a wrong way… my mother in particular… so because my mother couldn't help me, we turned to a private tutor… because the teacher couldn't… she was practically unable, it was very difficult for her [the teacher] to handle this… (S24)
Learning goals	2	it was… a little strange because in my mind mathematics was equations, it was geometry, it was exercises… at the university it was a bit more about the methodology of mathematics and how to learn to think about each exercise' rationale… because we wouldn't solve them, the children in the school [would]… and it was a bit difficult to learn to think like that… (S07)

Table 5. *The distribution of life events across educational levels (by number of events)*

Life event	**Educational level of PPT at time of event**		
	Primary	Secondary	Tertiary
Pedagogical approach	8	10	17
In-class behaviour	1	6	9
Proficiency in mathematics	5	0	0
Learning goals	0	0	2
Content of mathematics	2	3	12

Table 6. *Frequencies (number of participants) and representative excerpts for coping strategies*

Coping strategy	Frequency	Interview excerpt
Instrumental support	23	He [the lecturer] also gave us some exercises, I tried to solve them… my brother who is a science major also helped me, so I also asked for his help… (S20)
Active coping	22	I could see that I didn't understand some of it… I solved again and again the exercises… I didn't seek for a private tutor; I didn't even think about it… I also searched for some online videos… YouTube videos that explained the subject or had similar exercises… (S01)
Venting	13	From the fifth grade onwards, everyone was saying that it's a difficult grade… I was a bit predisposed… I always told myself 'Fifth grade math is difficult…' because I was working really hard and something always went wrong and I was like 'what went wrong again?' (S13)
Planning	10	I wanted… to be prepared when I go to the classroom, to know what I will say to the pupils and how I will say it, so that they understand it and… (S06)
Behavioural disengagement	10	In high school, we had a completely indifferent teacher… who never explained the terms or theory or taught us anything… and we were having tests… obviously no one was doing well, then this became evident in my grades, then it spread and… yeah… I gave up after a point… (S06)
Mixed support	6	We had a very good math teacher, very thorough, who explained everything to us… she solved everything for us and she had a lot of passion for her work which was evident… so, we also got this feeling to get busy, so to speak… so, for this reason, I also took courage again and I became better… (S20).
Self-blame	5	I'm such a person that… I don't like too much admitting that I have failed… because I consider the whole problem with mathematics a failure… and… I think that it has affected me […] it has left a very strong feeling/some kind of very strong impression on me… (S18)
Acceptance	5	I usually say that 'we're not all that good at math, some of us need a little more help', I've understood that I'm weak in math, so I know what's going on… (S15)
Positive reframing	4	Maybe it's this insecurity that I feel and makes me more organized… I don't want to have gaps that will embarrass me and say… 'you know what, I have a gap here, I can't teach' and when you go to a classroom you can't have that gap because the children want to learn from you… (S22)
Emotional support	4	I was very scared… and I had asked my mum to get me a private tutor… I had asked her and she said to me 'do you want me to bring a private tutor so you don't feel bad?' (S13)
Denial	1	In junior high school this got worse, in senior high school I acted like mathematics didn't exist… (S06)

When examined in a developmental manner, most of the reported coping strategies were distributed throughout participants' education (active coping, instrumental support, acceptance, emotional support, mixed support, behavioural disengagement, venting and self-blame) whereas others, were mentioned being used only at certain levels (planning, denial, positive reframing) (Table 7). Active coping, planning, acceptance, venting, and self-blame were predominantly employed at the tertiary level, while instrumental support was mainly used during a participant's secondary and tertiary years. Emotional support was a less commonly utilised strategy whereas, positive reframing was implemented only at the university. Interestingly, behavioural disengagement and emotional support were almost equally used across educational levels however, the latter was a less frequently used strategy.

Table 7. *The distribution of coping strategies across educational levels (by number of participants)*

Coping strategy	Educational level of PPT at the time of employing a coping strategy*		
	Primary	Secondary	Tertiary
Active coping	3	4	22
Planning	0	1	10
Instrumental support	4	16	16
Denial	0	1	0
Acceptance	1	2	5
Emotional support	1	2	2
Positive reframing	0	0	4
Mixed support	1	3	4
Behavioural disengagement	5	5	8
Venting	4	6	11
Self-blame	1	2	3

**Note*. The number of participants using a coping in each educational level in this table does not correspond to the total number of participants using a specific coping strategy in Table 6. This is because frequencies in Table 6 have been calculated on a per case basis (number of participants using a specific coping strategy) whereas, in this Table frequencies have been calculated on a per educational level basis (number of participants used a specific coping strategy in primary, secondary and tertiary education).

The case of Sophia

Introducing Sophia. Sophia was admitted to the university after succeeding to the mandatory nationwide entrace exams (Panhellenic Exams), without been examined in mathematics; this meant that she had not studied mathematics for two years prior her admission. When interviewed, Sophia was in the fourth year of her studies; she had successfully attended three compulsory modules in mathematics and was doing the second part of the practicum.

Primary education. Since elementary school, Sophia had a very problematic relationship with mathematics, a relationship that was characterised by having a lot of "gaps" which were never properly addressed. According to Sophia, these discontinuities were caused by primary education teachers who never concentrated their efforts on supporting her and other pupils who like her faced difficulties with mathematics. Sophia felt as belonging to a group of students who "do not get mathematics" and gradually developed a fear that was often somatised:

> "…they did not deal with it… they supported students who were better in mathematics, the stronger ones… […] they did not adapt their teaching for us, they did nothing in particular, so… I developed a fear for mathematics… I remember, sometimes my belly was hurting because of my anxiety for mathematics…"

Her constant struggle and the absence of support from her teachers, led Sophia to appraise her experiences as threatening and impossible to attend. Teachers who saw Sophia's case as a lost cause, distanced themselves and progressively demonstrated behavioural disengagement. Consequently, Sophia avoided doing mathematics and little by little, she constructed an internal narrative which encapsulated "her" failure and continuous disappointment in herself: "I was saying to myself that I am not good at mathematics, that my teachers are tired of dealing with me and… I also stopped doing mathematics, telling myself that I am not good…"

This "narrative identity" became the prism through which Sophia interpreted subsequent LEs, a process which validated her previous appraisals and decreased her confidence in mathematics. One particular LE really stood out for Sophia; the event involved a primary teacher and his efforts to motivate her to participate in the class activities:

> "I remember very distinctly, that… we were doing mathematics and… the teacher wanted to call someone to the board and… somehow, he mentioned my name… and he said… 'there's no chance Sophia would want to come to the board' something like that, implying that I wasn't good in mathematics and he added… 'and even if she gets up, do you think she'll be able to solve it?' something like that, I'm sure, I remember this incident very well… "

Because of that incidence, Sophia felt exposed and ashamed. She felt unable to cope and chose to further distance herself from mathematics. It seems that this particular LE and its appraisal became critical for her future development because after this, Sophia abandoned any attempts in learning mathematics:

> "I felt all eyes on me, I felt ashamed and disoriented when he said that in front of all of my classmates… […] this event stigmatised me, I felt very bad with myself, I felt I was not good, I felt like he was saying to me 'you are nothing'… […] from that moment on, I stopped doing mathematics…"

Secondary education. In the following years, Sophia's internal narrative about her disfluent self was cemented and amplified. In junior high school (Gymnasium), her math teacher's indifference reinforced her perceived inability to cope and confront her issues and sustained her mathematics anxiety. This made Sophia to further disengage and distance herself from mathematics:

> "My math teacher used to call us to the blackboard… […] and when my turn came… I was very afraid because I didn't understand him… I was supposed to draw perpendicular or parallel lines… and I didn't know how to handle the set square and he didn't help me, he didn't show me, you know… he didn't tell me 'hold it like this, do that', he didn't help me at all and he just said 'ok, sit down' and… since then he called me [to the blackboard] two or three more times and he realised that I was struggling… and after a while he stopped calling me … generally speaking, in junior high school I wasn't really involved in mathematics, the truth is… I don't remember any other incidents because I was saying to myself… 'this subject is not for you' or 'you will not do mathematics anymore'…"

By the end of junior high school and at the beginning of senior high school (Lyceum), Sophia felt more motivated to deal with her fear for mathematics and wanted to ensure that her future choices would not be limited by her previous experiences. She had decided to join the police academy and in order to do so, Sophia had to follow a direction in her studies that included mathematics as a subject. Although Sophia was very hesitant at first, with her father's support, she sought help from a private tutor and started working hard. As time passed, Sophia felt more confident and for the first time in her life, she actively participated in the class activities and even volunteered to solve problems on the blackboard; as a result, her grades significantly improved. However, at some point Sophia realised that her efforts were pointless:

> "…the problems I was supposed to solve on the blackboard… I learned to solve them by heart… in order to simply get a high grade… all I cared about was getting a high grade… at some point the math teacher asked me: 'did you memorise the solution?' and I answered 'uh, yes' and he replied 'what's the point of doing that?' […] at that moment I realised that… I was doing private lessons for no reason…"

Sophia was not in a position to identify the cause of this outcome and attributed this failure to her gaps, a narrative that stemmed from her disfluent identity. It appears that her perception of improvement in mathematics was driven by the belief that achievement (i.e., high grades) is equivalent to understanding mathematics. This view was probably enhanced by the pressure she was feeling for the Panhellenic Exams, and provided the basis for justifying her fixation on memorisation and rote learning:

> "I was thinking that… I will not succeed because I had too many gaps in mathematics and that it would be impossible to… cover them in such a short period of time… I was sure that I will fail in mathematics…"

After this incident, Sophia put a decisive "end" and abandoned any efforts in dealing with her "gaps" or coping with her mathematics anxiety. Driven by her fear and anticipation of failure in the Panhellenic Exams, Sophia chose a direction in her studies that did not include mathematics as a subject (by that time she had also abandoned the idea of joining the police academy). During the last two grades of Lyceum, Sophia's preparation for the exams meant that she had to focus on other subjects; although mathematics was part of the school curriculum, her mathematics teacher saw no reason in teaching students not following a particular route; as a result, Sophia totally abandoned mathematics:

> "I did nothing in mathematics and the teachers had noticed it and… basically they didn't even teach us as far as I remember… in the third grade [of Lyceum] we had a teacher who had noticed what was going on and he didn't… he would just walk into the classroom and… sit…"

Tertiary education. Sophia's previous appraisals led her to believe that even at the university, her experience with mathematics would be the same; before even attending her first class in mathematics, she anticipated that lecturers would behave and teach in ways similar to her previous math teachers:

> "…at the beginning, in the first lecture, before attending his classes, I felt a fear that he would be… like the teachers I had in junior and senior high school and I won't understand what he'll say to me but… no… I had a very positive experience, even from the point of view that… he had many different ways of explaining to us what he was saying…"

The lecturer's approach seems to have helped Sophia in coping with her fear and for the first time since junior high school, she began studying mathematics again. It seems, though, that even a significant change such as this, only had a temporal effect; during the exams, Sophia's disfluent narrative identity came into operation and made her feel very doubtful about her abilities. As a result, she decided to postpone her mathematics modules' exams for the next period, a decision which was also influenced by her desire to achieve high grades:

> "I felt that… I didn't have the time I wanted to devote for studying mathematics, I wanted to feel 100% sure about it… and also, I didn't want to just pass mathematics and in general I do not want to pass the modules with a low grade, so I prefer to be properly prepared and get a high grade that way…"

During her practicum, Sophia had to prepare and teach lessons for three subjects; when she realised that mathematics was one of them, she instantly felt threatened and anxious. Despite Sophia's initial reaction and the pressure she felt from her mentor and the class' teacher, she worked hard and managed to successfully teach the lessons assigned to her:

> "I remember myself constantly studying mathematics, being very determined, in case the pupils ask me something I didn't know… I had a fear that… also my mentor was there, to see what we were doing, if the children understand etc… and I also had the anxiety that my mentor will enter [the classroom] and the pupils will ask me something and I won't be able to answer their question… well… I was also worried about the teacher [because] although in the previous semester she chose to be outside of the classroom, in this semester she chose to observe [the class]… uh… and I felt like… also an anxiety… but… until now I've taught one lesson and it went really well…"

When asked to reflect upon her experiences with mathematics and what she had learned so far, Sophia replied:

> "…it is very much related to the teachers… and… I will say more with elementary school teachers… this is where your whole experience begins, your whole 'image', I think your whole impression [of mathematics] is formed during elementary school… because if I didn't have those teachers in elementary school, I think things would have definitely been different, much better… I would have a very positive experience and view about maths and I think that now… because of that [my experiences]… this is not going to change…"

Discussion

Most of the identified in our sample LEs were related to an instructor's pedagogical approach or in-class behaviour and, the difficulty of mathematics as a subject. Although these types of events have been reported by previous studies (e.g., Bekdemir, 2010; Öçal, 2021), LEs related to an instructor's pedagogical approach (not accepting alternative solutions, not providing appropriate feedback, not having class control) or shifts in the way PPTs approach mathematics (learning goals) have not been widely acknowledged in the literature. LEs in the last category can be viewed as being relevant to PPTs' developing identity, which entails shifts in the ways PPTs make sense of themselves as teachers (Brown & McNamara, 2011) or as part of their progress of mathematical pedagogical content knowledge (Ball et al., 2008). When examined in a developmental manner, some LEs were found to be distinct at certain educational levels: proficiency in mathematics was connected to primary teachers only; specific aspects of an educator's pedagogical approach (e.g., providing feedback, losing control of the class) were related to only secondary mathematics teachers and; changes in a PPT's learning goals were encountered while being at the university. Interestingly, none of the reported LEs were related to assessment; this finding is in line with previous studies suggesting that mathematics anxiety may not be limited to testing situations (e.g., Stoehr, 2017) or the literature supporting that mathematics anxiety is a distinct form of anxiety, different from test anxiety (Cipora et al., 2022).

Three main categories of coping strategies were identified: problem-focused, directed at finding solutions to LEs perceived as being threatening; emotion-focused, aiming at managing the resulted from an LE emotions and; less effective coping strategies. From this perspective, strategies identified by previous studies can be positioned within the wider literature, allowing us to make better inferences and draw conclusions; for example, the eight coping strategies identified by Stoehr and Olson (2023) can be grouped as problem-focused strategies including active coping (finding online resources, using the mathematics curriculum guide), planning (being prepared, understanding the mathematics content to be taught), instrumental support (turning to trusted colleagues, sharing and shifting the teaching responsibility with students) and, emotion-focussed strategies (being honest with students, being kind to themselves).

Active coping and planning were reported being used mostly at the university, while instrumental support was mentioned as being mainly employed during both secondary and tertiary education. By contrast, strategies aiming at dealing with the emotions generated while experiencing an LE (acceptance, emotional support, positive reframing, denial) were the least used across our sample. One potentially alarming aspect of our findings pertains to the use of certain less effective coping strategies: approximately half of the PPTs in our sample reported becoming behaviourally disengaged, this type of coping was used across all educational levels and even more frequently at the tertiary level (Table 5). The use of such strategies is associated with increased levels of psychological distress and may only be useful in the short term (Dwyer & Cummings, 2001; Newman, et. al., 2011). However, becoming behaviourally disengaged is not the most effective or helpful way of coping in reducing stress and since PPTs in our sample might have previously relied on this type of coping strategy, using it repeatedly may have resulted in eventually becoming part of a PPT's coping repertoire.

Sophia's developmental trajectory presents an example of how recurring appraisal cycles generate an internal narrative through which students interpret their learning experiences and develop mathematics anxiety. Sophia's interpretation of LEs in primary school resulted in having the belief that she is "bad" at mathematics,

creating in this way a self-fulfilling prophecy that followed her throughout in high school. Sophia's description of mathematics anxiety was expressed in the form of a "gap" an empty space that was created by her primary teachers and was never filled. Sophia's traumatic experiences influenced her behaviour of being disengaged and created many obstacles; after a certain point, she gave up. The choice to abandon mathematics in senior high school became further reinforced by a mathematics teacher embodying a culture which considers students not pursuing degrees including mathematics unworthy of support. Although Sophia's experience with mathematics at the university was positive and radically different, her internal narrative of a student incompetent of understudying and doing mathematics continued to feed and sustain her fear.

Our results are consistent with Cipora et al.'s (2022) contention that the mathematics anxiety field is at a crossroads, calling for greater investigation into not only prevalence and correlates, but into underlying processes for what maintains or nitigates it. The current study answers the above call by being interpretative in nature with focus on internal dialogue and appraisal to show how early negative life events might mold a disfuent self to impact coping processes in PPTs. In particular, Cipora et al. call for moving away from inflexible, trait–based models of mathematics anxiety and towards more active, person-based models –a stance that appeals to our case-study analysis (e.g., Sofia). Including this direction in the subsequent intervention can allow for more time-specfic and individualized approaches to breaking the mathematics anxiety cycle for teacher trainees.

It is necessary to consider some limitations of this work. The study employed only one data collection method (interviews) which can possibly have led to recall bias (accuracy of information about LEs and coping strategies) and response bias (social desirability effect). In addition, due to the purposeful sampling method used, the study may not provide a complete picture of how PPTs during their first years of studies experience mathematics at the university.

Our findings highlight that an educator's pedagogical approach and in-class behaviour could play an important role in creating stressful LEs with mathematics. LEs linked to a teacher's pedagogy and overall behaviour are already known and in fact, some authors consider primary teachers responsible for causing developmentally significant stressful LEs (Jackson & Leffingwell, 1999) or playing a crucial role in creating a mathematics anxiety circle (Bekdemir, 2010). Sophia's case demonstrates that the appraisal of stressful LEs is an ongoing process consisting of multiple cycles that occur throughout a PPT's schooling years. As they unfold, LEs may contribute towards the development of a disfluent self-narrative which creates a self-fulfilling prophecy about a PPT's ability to learn and teach mathematics. In this process, the use of maladaptive coping strategies such as behavioural disengagement are problematic because PPTs view their ongoing and future development in a static manner. Thus, focussing on how PPTs interpret certain events as stressful and how they respond to such events are crucial components for future inquires, a recommendation made by other authors as well (Ramirez et al., 2018; Stoehr, 2017).

Additionally, our findings relate to and can further promote the discussion about the provision of support to PPTs who have experienced or still experience stressful LEs or mathematics anxiety. Traditionally, math support centres have been established for undergraduate mathematicians and engineers (e.g., Lawson et al., 2020) and in recent times for undergraduates in Psychology, Nursing, Biochemistry and, Exercise and Sports Biomechanics (e.g., Jackson, 2022). The interpretation account calls for a different approach and Sophia's story is a case in point; if PPTs have prolonged negative experiences with mathematics which could create a disfluent narrative about the self, further exposure or "positive" experiences with mathematics at the university might not be enough. Such cases need support in regulating their negative appraisals and reconstructing their narrative identity. Interventions of this kind exist however, they have not yet been implemented with PPTs. These include expressive writing, an activity during which math anxious students write openly what they think and feel about stressful events (Park et al., 2014) and self-distancing, a technique used for appraising past events from a distanced observer's perspective (Kross & Ayduk, 2011).

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Η ανάπτυξη του μαθηματικού άγχους ως διεργασία αποτίμησης

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Γεγονότα ζωής
Μαθηματικό άγχος
Στρατηγικές αντιμετώπισης
Υποψήφιοι εκπαιδευτικοί πρωτοβάθμιας εκπαίδευσης

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ΠΕΡΙΛΗΨΗ

Η βιβλιογραφία σχετικά με τις στρατηγικές αντιμετώπισης που χρησιμοποιούν οι οι υποψήφιοι/υποψήφιες εκπαιδευτικοί της πρωτοβάθμιας εκπαίδευσης (ΠΔ) όταν βιώνουν στρεσογόνα γεγονότα ζωής (ΓΖ) σε σχέση με τα μαθηματικά είναι περιορισμένη και τα μοντέλα μαθηματικού άγχους δεν μπορούν να εξηγήσουν επαρκώς γιατί οι αρνητικές εμπειρίες οδηγούν στην ανάπτυξη άγχους για τα μαθηματικά. Η παρούσα μεικτή μεθοδολογική μελέτη βασίζεται στη θεωρία της ερμηνείας (interpretation account), ένα εννοιολογικό πλαίσιο που δίνει έμφαση στον ρόλο των εσωτερικών αφηγήσεων και των γνωστικών αποτιμήσεων των ατόμων στη διαμόρφωση των συναισθηματικών τους αντιδράσεων απέναντι στα μαθηματικά. Ποιοτικά δεδομένα συλλέχθηκαν μέσω ημιδομημένων συνεντεύξεων με 24 ΠΔ και αναλύθηκαν θεματικά, με στόχο την αναγνώριση κοινών τύπων ΓΖ και στρατηγικών αντιμετώπισης. Το ποσοτικό σκέλος περιλάμβανε περιγραφική στατιστική ανάλυση της συχνότητας και κατανομής αυτών των στρατηγικών, ανάλογα με το εκπαιδευτικό επίπεδο και το χρονικό πλαίσιο εμφάνισης των ΓΖ. Η ανάλυση έδειξε ότι τα περισσότερα ΓΖ σχετίζονταν είτε με τις παιδαγωγικές πρακτικές και τη συμπεριφορά των εκπαιδευτικών στην τάξη είτε με τη δυσκολία που αποδίδουν οι υποψήφιοι/υποψηφιες εκπαιδευτικοί της πρωτοβάθμιας εκπαίδευσης στα μαθηματικά. Οι συμμετέχοντες/ουσες υιοθέτησαν κυρίως στρατηγικές επίλυσης προβλημάτων (π.χ., αναζήτηση βοήθειας, ενεργή αντιμετώπιση, σχεδιασμό), αλλά έκαναν χρήση και λιγότερο προσαρμοστικών στρατηγικών όπως η συμπεριφορική αποστασιοποίηση. Η χρήση της συμπεριφορικής αποστασιοποίησης καταγράφεται σε όλες τις βαθμίδες εκπαίδευσης και ακόμη πιο συχνά στην τριτοβάθμια. Καταλήγουμε προτείνοντας παρεμβάσεις για την υποστήριξη των υποψήφιων εκπαιδευτικών στο να επιλέγουν αποτελεσματικές στρατηγικές αντιμετώπισης και στην αναδόμηση του αφηγήματος της δυσλειτουργική τους ταυτότητας που διαμορφώθηκε μέσα από αρνητικές εμπειρίες με τα μαθηματικά.

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