Subject-specific factors interacting with mathematics teacher wellbeing: A scoping review

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Abstract: A global concern over the shortage and high attrition rates of mathematics teachers is frequently linked with teachers' wellbeing struggles. While there exist general frameworks of teacher wellbeing, they often overlook the subject specific challenges that mathematics teachers face. This scoping review of 20 years of research explores how mathematics interacts with teacher wellbeing conceptualised through both hedonic and eudemonic lenses. Key findings show that weak subject knowledge, low mathematical confidence, past negative experiences with mathematics, and curriculum pressures heighten mathematics teacher stress, frustration and anxiety. Conversely, strong subject knowledge, meaningful subject specific professional development, as well as students' engagement with mathematics and developing conceptual understanding of the content enhance teacher feelings of enjoyment, happiness and pride. Importantly, the review emphasises tensions experienced by mathematics teachers related to misalignments between curriculum, policy and teacher beliefs around mathematics as a discipline and, consequently, effective mathematics pedagogy. These tensions, which seem to align with the dichotomised narratives around mathematics, show to have significant implications for mathematics teacher wellbeing. The review highlights the urgent need for subject-specific frameworks to better support mathematics teachers, arguing that, without addressing the nuanced subject specific pressures that mathematics teachers face, efforts to improve mathematics teachers' wellbeing might remain ineffective.

Keywords: mathematics teacher wellbeing, subject specificity, review

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1 Introduction

One of the great current challenges globally is a chronic shortage of mathematics teachers (Coughlan, 2018; Hazell, 2018). While recruitment in STEM subjects continues to be difficult (Foster, 2019; Worth et al., 2015), high teacher attrition levels (with up to 50% of STEM teachers leaving the profession within five years of qualifying, Foster, 2019; Sibieta, 2020; Worth & Da Lazzari, 2017) are of even greater concern. One of several narratives surrounding this attrition speaks of an 'epidemic of stress' among teachers (Asthana & Boycott-Owen, 2018; Tapper, 2018); stress which in 2020 led 53% of teachers in countries like England reporting the urge to leave the profession due to wellbeing struggles (ES, 2020). Teacher attrition and

wellbeing seem to be closely interwoven into an educational crisis (Falecki & Mann, 2021), making mathematics teacher wellbeing of urgent global interest.

A recent review of research in teacher wellbeing advocated that it is necessary to consider domain specificity within wellbeing frameworks, if they are to be fit for purpose (Hascher & Waber, 2021). Yet, despite growing interest in (mathematics) teacher wellbeing, prominent theoretical models of the concept of wellbeing focus predominantly on global and generalist aspects and lack the discipline specificity (Kern & Wehmeyer, 2021). Mathematics as a discipline carries distinct problematic narratives (e.g. fixed ability and talent beliefs versus growth mindset), epistemic structures (e.g. mathematics as a rigid entity versus a creative science), and pedagogical demands (e.g. exposure of vulnerability during public engagement with mathematics where errors are immediately visible and critically judged), which bear implications for stronger negative emotional and affective experiences of mathematics teachers compared to those in other subjects (Mujtaba & Reiss, 2013). Consequently, exploring the interactions between the subject and mathematics teacher wellbeing (MTWB) seems necessary. If this interaction is evident, any targeted global or local interventions and initiatives, aiming to effectively support mathematics teachers in the profession, will require both general and domain-specific dimensions.

Over the past three years, we have been exploring mathematics teacher wellbeing, and during that time, we have encountered only a handful of studies that specifically spoke to this issue. Consequently, with a goal of tackling the question of the concept of MTWB and its subject-specificity, we undertook a scoping review of 20 years of research in mathematics teacher education. The review revealed that among the 37 articles that met our inclusion criteria (for more details see the methods section and the larger review Hill & Marschall, under review), only 15 referred to the term ‘wellbeing’, with eight of these focusing explicitly on the concept (Collie & Martin, 2017; Jian et al., 2023; Karakus et al., 2021; Mattern & Bauer, 2014; Shoshani, 2021; Wang et al., 2022; Willis et al., 2023; Yeigh et al., 2023). While featuring in the sphere of *mathematics* teacher education, all eight studies conceptualised the wellbeing of mathematics teachers using general wellbeing definitions, frameworks and associated factors. These included: affective wellbeing seen as “the presence of job satisfaction and the absence of perceived stress and emotional exhaustion” (Mattern & Bauer, 2014, p. 60) or as “strength and regularity of good and bad feelings and state of mind” (Karakus et al., 2021, p. 239); teacher professional wellbeing defined as “teachers’

positive evaluations of and healthy functioning at work" (Collie & Martin, 2017, p. 31) or "teachers' meaning at work, teaching satisfaction, positive and negative emotions, teaching efficacy and emotion regulation efficacy" (Shoshani, 2021, p. 744); utilising Seligman's (2011) PERMA (Positive Emotion, Engagement, Relationships, Meaning and Accomplishment) framework (e.g. Yeigh et al., 2023) or Ryan and Deci's Self-determination Theory (e.g. Wang et al., 2022). What we learn from these studies is that mathematics teacher wellbeing correlates positively with: teacher perceived autonomy support and adaptability (e.g. Collie & Martin, 2017); teacher knowledge, cognitive and behavioral engagement (e.g. Jian et al., 2023); teacher self-efficacy (Karakus et al., 2021); teacher cognitive self-regulation (e.g. Mattern & Bauer, 2014) and growth mindset (e.g. Shoshani, 2021); job crafting (e.g. Wang et al., 2022); teacher identity (e.g. Willis et al., 2023; Yeigh et al., 2023).

While helpful, none of these tackles an explicit interaction of MTWB with mathematics-specific factors. In order to address the issue of research scarcity, and to start tracing a path towards conceptualising MTWB with all its general as well as subject-specific facets, we decided to broaden the scope of or review (see below). In this report, we are exploring one aspect of this work, naming ways in which mathematics can be seen as interacting with the concept of MTWB. This aim was addressed through the following questions:

> RQ1: What subject specific factors feature in research which engages with hedonic aspects of mathematics teachers' wellbeing?
>
> RQ2: What subject specific factors feature in research which engages with eudemonic aspects of mathematics teachers' wellbeing?

By explicating the necessity of bringing mathematics to discussions about MTWB, this paper seeks to provide an opening towards more comprehensive understanding of this wellbeing.

2 The concept of teacher wellbeing

The concept of teacher wellbeing can be described in variety of different ways (Jian et al., 2023) and operationalized through different theoretical perspectives. Critical aspects of all these perspectives, however, can be captured within a broader definition of wellbeing as 'feeling good and functioning well' (Huppert & So, 2013). This definition reflects a broad wellbeing framework from positive psychology, under two philosophical foundations: hedonism and eudemonia. Hedonism, which represents

affective and subjective components of wellbeing, speaks to individuals' own assessment of their life on the basis of experiencing positive feelings of happiness and pleasure or the absence of negative feelings (e.g. Daniels, 2000; Gregory, 2016; Heintzelman, 2018). As such, it speaks predominantly to positive/negative affect, emotions or feelings (e.g. Diener et al., 2010; Huppert & So, 2013; Keyes, 2005; Seligman, 2011; Tennant et al., 2007).

Eudemonia considers flourishing and achievement of what is worthwhile or valuable in life, personal excellence or best self (e.g. Huta & Waterman, 2014). In this sense, contrary to hedonism, eudemonia might see moments of negative affect/feelings as necessary byproducts of the pursuit of higher virtues and fulfilment (Huta & Waterman, 2014; Ryan & Deci, 2001). This domain encompasses aspects such as: engagement, relationships, meaning, and accomplishments (e.g. Seligman, 2011); social wellbeing (e.g. thriving in public and social lives; e.g. Keyes, 2005); psychological functioning (e.g. energy, clear thinking, self-acceptance, personal development, competence, and autonomy; e.g. Tennant et al., 2007); competence, meaning, resilience, vitality (e.g. Huppert & So, 2013); living a purposeful and meaningful life, being engaged and interested in life, feeling competent and capable, having self-respect and feeling optimistic (e.g. Diener et al., 2010).

Although the two strands can often be treated and operationalised separately, they are, in fact, difficult to disentangle, as they operate in close proximity and interact with one another. For example, a feeling of discomfort during managing student centred pedagogy (i.e. negative hedonic experience), when managed successfully, can lead to increased teacher self-efficacy (i.e. positive eudemonic aspect) and, consequently to feelings of happiness and elation (i.e. positive hedonic experience). Indeed, the most comprehensive frameworks of teacher wellbeing incorporate both hedonic and eudemonic domains. It is this broad approach that we have taken in this review.

3 The method

The review considered research focusing on in-service mathematics teachers (primary and secondary), published in peer reviewed journals between 2004-2024. Due to scarcity of research on MTWB we operationalized the search within the scoping review through, not only the general concepts of well/illbeing, hedonism, eudemonia, but also a wide variety of concepts within the hedonic and eudemonic domains. Under the former, we considered any research speaking of emotions, affect and feelings

(such as stress, burnout, anxiety, enjoyment, hope, satisfaction, happiness, pleasure, etc.); under the latter, we focused on concepts related to professional functioning at work such as self-regulation, self-efficacy, flourishing, thriving, resilience and their various derivatives (see Figure 1 for in/exclusion criteria).

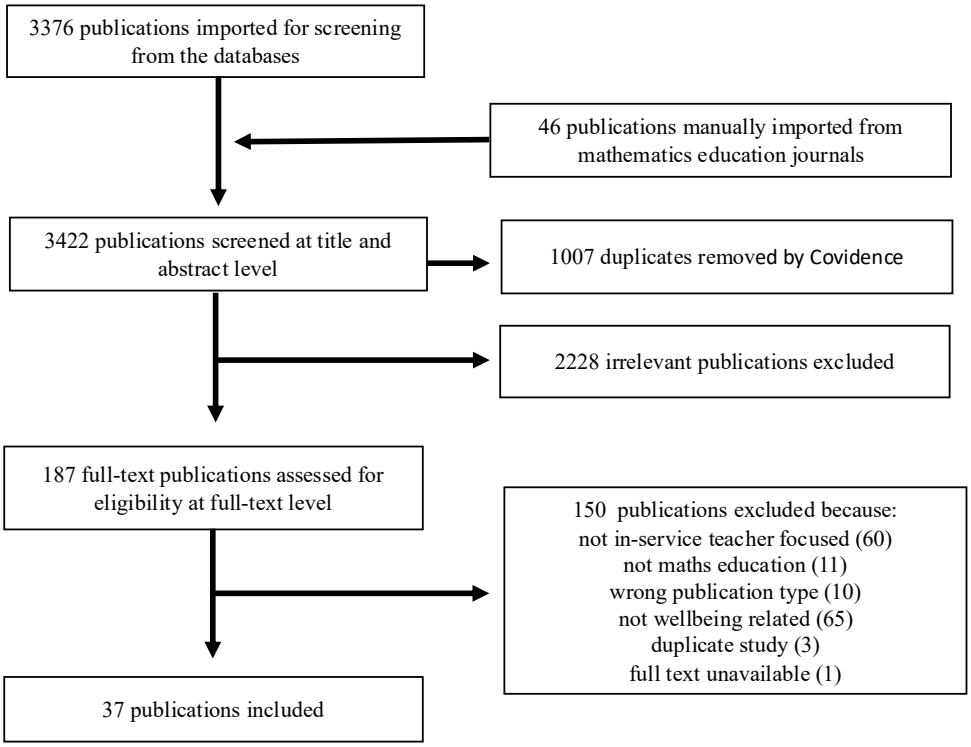
The initial automatic searches across Elsevier and EBSCOhost platforms using the following databases: Scopus, PsycINFO, Academic Search Complete, Education Source, and ERIC, as well as manual searches across fifteen key mathematics education and teacher journals (e.g. Educational Studies in Mathematics, Journal of Mathematics Teacher Education, Mathematics Education Research Journal) yielded a total of 3422 articles. Out of those, Covidence (Veritas Health Innovation, 2025), removed 1007 duplicates. Following this, in the process of manual screening, the two authors removed 2228 works (in stage 1, abstract screening) and then further 150 works (stage full text reading) that did not satisfy the inclusion criteria.

Figure 1. Inclusion/ exclusion criteria

Parameters	**Inclusion criteria**	**Exclusion criteria**
Timeline, language & article type	Published peer reviewed journal articles in English from 2004 onwards	Published before 2004.
Wellbeing concept	Focusing specifically on topics related to wellbeing, hedonism and eudemonia	Not specifically focusing on topics related to wellbeing, hedonism and eudemonia
Participants	In-service primary or secondary mathematics teachers.	Pre-service teachers, or teachers of subjects other than mathematics
Subject context	Mathematics (education)	Unclear distinction between mathematics and other STEM disciplines
Methodology	Quantitative, qualitative or mixed methods study	Survey psychometric validation study

This led to an inclusion of 37 articles in the scoping review (Turkey #5, Australia #5, Germany #4, Israel #3, United States #3, China #3, Cyprus #2, Greece #2, Mexico #2, United Kingdom #2, Belgium #1, Canada #1, Ethiopia #1, South Africa #1, Taiwan #1, unknown #1). Of these: 18 studies included secondary, 15 primary, 4 both secondary and primary school levels; 23 used quantitative, 9 qualitative, 3 mixed and 2 experimental methodological designs (see Figure 2).

Figure 2. RISMA Flowchart



3.1 Analytical approach

When exploring subject-specific factors of MTWB, we scrutinised the findings of each article and searched for any 'causal' relationships between the different aspects of mathematics teachers' professional lives and different domains of their wellbeing. When discerning the idea of potential causality in qualitative research we focused on explicit expressions such as, for example, "I was very happy <joy> that she had a question" (Kourti & Potari, 2024, p. 13), which we interpreted as indicating an aspect that contributed to the teachers' particular feelings/experience. If any articles reported on correlative relationships (with no explicit direction of their influence), for clarity around the concept of 'factor/contributor', we did not include these in our findings.

4 Findings

4.1 Subject specific factors of a hedonic dimension of MTWB

Perhaps unsurprisingly, subject content knowledge and competence featured heavily as significant factors of hedonic aspect of MTWB. For example, studies reported teachers experiencing high level of anxiety due to their lower academic qualifications in mathematics (Atnafu, 2014) or lack of mathematics specialisation (Artemenko et

al., 2021; Patkin & Greenstein, 2020). Similarly, teachers with self-proclaimed poor mathematical ability, based on struggles with understanding the content at younger age (Dove et al., 2021), or limited mathematics knowledge were seen to be experiencing mathematics anxiety and a fear of teaching (García González & Martínez Sierra, 2020). Negative feelings included shame experienced as a result of struggles to correct own mathematical work, particularly during public problem solving (García González & Martínez Sierra, 2020). On the contrary, teachers with stronger subject knowledge (e.g. technology pedagogical mathematics knowledge, Jian et al., 2023) and those with developing mathematical thinking skills, experienced a decrease in stress levels, fear, and anxiety (e.g. Küçüktepe & Balkan, 2021; Yorulmaz et al., 2017). Studies reporting on professional development (PD) initiatives somewhat asserted this, showing how targeted subject-focused PD activities, revolving around, for example, teaching challenging mathematics tasks (Russo, Powers et al., 2023) or developing teachers' mathematical spatial ability (Ping et al., 2011) contributed to increasing teacher enjoyment and confidence, while decreasing their anxiety.

Other important aspects related to specific conceptualisations of mathematics as a discipline. For example, PD initiatives focusing on reframing mathematics from a rigid abstract subject which rewards only correct answers, to one which can be conveyed using non-technical language and which focuses on playful processes of learning, were shown to support shifts in teachers' feelings from negative to positive (e.g. enjoyment) (Askew & Venkat, 2017). Similarly, PD which focused on growth mindset over fixed ability, which helped teachers reframe their self-concept in mathematics and enthuse grit and determination, played a big part in increasing teachers' job satisfaction and enthusiasm for mathematics and its teaching (Shoshani, 2021).

These experiences can be seen to extend further to teachers' sense of their professional identity related directly to mathematics. On the one hand, we can see teachers experiencing anxiety when not being able to identify as a mathematics teacher (García González & Martínez Sierra, 2020), or experiencing shame as a result of feeling excluded from the community of those who "can do" mathematics (the latter relating to the teachers' perceptions of social judgements of mathematical ability, e.g. Askew & Venkat, 2017). On the other hand, we have teachers whose strong sense of teacher identity and the feeling of belonging to the mathematics community helps them feel enthusiastic about being a mathematics teacher and experience positive feelings while at work (e.g. Yeigh et al., 2023). These can link further with teachers'

personal relationship with mathematics. For example, we can see teachers' positive attitudes toward mathematics being associated with lower anxiety (Atnafu, 2014), or value attributed to mathematics positively affecting teachers' hedonic experiences (Chatzistamatiou et al., 2014).

Tensions associated with pedagogical approaches and curriculum challenges were also shown to be significantly influencing hedonic MTWB (e.g. Andrà et al., 2019; Charalambous & Philippou, 2010; Martínez Sierra et al., 2022). Teachers reported experiencing pressure, confusion and frustration, resulting from misaligned conceptualisations of mathematics and its learning. These conceptualisations juxtaposed mathematics as an exploratory, sense-making discipline (in teachers' views) and mathematics as a subject which necessitates direct instruction, rote learning and memorisation of facts (as expressed by others; e.g. Andrà et al., 2019; Jiang et al., 2021). Naturally, these bore pedagogical consequences, exerted by external pressure for direct instruction (e.g. Jiang et al., 2021), employment of reform mandated approaches to problem solving, and promoting algorithmic thinking over reasoning (e.g. Charalambous & Philippou, 2010), which gave rise to teachers' anger, frustration and anxiety. Further experiences of negative emotions related to tensions around the conceptualisation of mathematics curriculum, such as: dense curricular content, forcing superficial coverage and resulting in students' lack of conceptual understanding of mathematics (Andrà et al., 2019; Martínez Sierra et al., 2022); or tightly bound primary mathematics curriculum, limiting exploratory and problem solving opportunities across different age groups (Andrà et al., 2019).

Different studies discussed the effect of students' engagement and success with developing conceptual understanding of mathematical content on teachers' hedonic wellbeing (e.g. Kourti & Potari, 2024; Martínez Sierra et al., 2019, 2022; Russo, Bobis, et al., 2023; Tsai & Antoniou, 2021). Speaking generally, Russo, Bobis et al. (2023) talked about teachers' enjoyment and happiness when their students experienced 'light bulb moments' in mathematics lessons. More specifically, Martínez Sierra and colleagues discussed teacher's experience of happiness when students showed understanding of calculus integrals and were making significant progress in the topic (Martínez Sierra et al., 2019); or teacher's joy and happiness when students managed to independently discover and appreciate a functional relationship between various aspects of a quadratic expression and its graphical representation (Martínez Sierra et al., 2022). Students' independence in these, related to having positive attitude to the difficulty of the set tasks, and supporting each other in resolving challenges to doubts

about the content, played a significant role in teachers' positive hedonic experiences (Martínez Sierra et al., 2019).

Kourti and Potari (2024) reported on teacher's feelings of pride when students were able to explain a solution to a posed question; as well as surprise, anger and anxiety when mathematically 'capable' students were not able to provide answers to factorisation problems. Considering 'weaker' students, the same teacher felt sadness when students were not able to comprehend mathematical content, leaving the teacher wondering whether they had done enough to support the students' learning. These seemed to relate further to students' own engagement with their learning. For example, the teacher expressed frustration and anger with students' poor management of their group work time and a lack of communication of experienced difficulties with the teacher. This, in turn, led to the teacher's experience of anxiety when the lack of time during the whole class consolidation phase did not allow them to slow down and unpack students' issues. On the contrary, when a student communicated difficulties and asked for help, the teacher experienced joy and great pleasure resulting from their ability to intervene and support the student's consequent understanding of the mathematical content.

4.2 Subject specific factors of a eudemonic dimension of MTWB

As was the case in hedonic aspects of MTWB, teacher knowledge, competence and confidence in mathematics (e.g. Xenofontos & Andrews, 2020) and its teaching (Chatzistamatiou et al., 2014) came across as strong contributors to teachers' eudemonic MTWB. In this case, PD initiatives focusing on subject specific aspects (e.g. explicit mastery experiences in the form of experimenting with manipulatives) or dialogic PD supporting teachers' development content appropriate pedagogy were seen as facilitators of this wellbeing (Hurdle, 2020).

Intersecting with these were teachers' own personal relationships with mathematics (such as positive attitudes towards (Atnafu, 2014) or value attributed to mathematics (Chatzistamatiou et al., 2014)) as well as teachers' past experiences with mathematics, which include relationships with own mathematics teachers in the past (Xenofontos & Andrews, 2020). For example, one mathematics teacher emphasised how his own teacher's unfair treatment of another student had a direct negative effect on their relationship with the teacher, leading to a longstanding broken relationship with mathematics. This, consequently, affected their ability to function well as a mathematics teacher (Xenofontos & Andrews, 2020).

Finally, one of the most prominent factors related to mathematics pedagogy, or more specifically to the extent to which mathematics teachers were able to realise their pedagogical visions (e.g. Charalambous & Philippou, 2010; Xenofontos & Andrews, 2020). On the one hand, Xenofontos and Andrews (2020) reported on teachers feeling capable in teaching mathematics well (i.e. teacher self-efficacy) when able to engage with mathematics in ways that reflected their own beliefs about and relationship with mathematics. For teachers with advanced mathematics knowledge this meant being able to focus on creating challenging classroom environments that helped promote students' deep understanding of mathematics; for teachers who felt less competent in mathematics this meant being able to create "classroom environments that minimise negative experiences, and in which children feel safe and comfortable with mathematics" (Xenofontos & Andrews, 2020, p. 273).

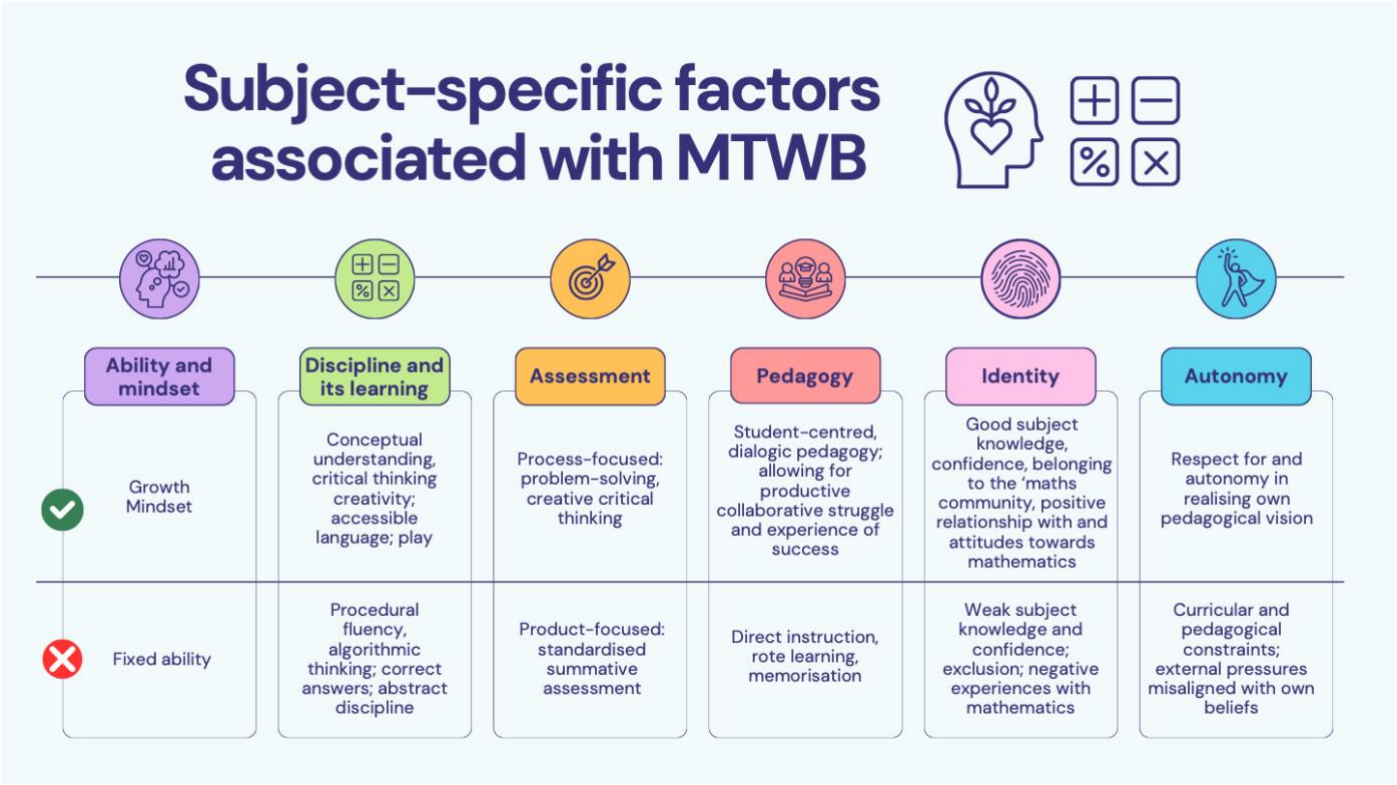
On the other hand, Charalambous and Philippou (2010) discussed teachers struggling with functioning well when experiencing difficulties when experiencing challenges arising in the classroom in the light of a new problem-solving policy. While some felt that this was a result of the policy's promotion of algorithmic thinking over reasoning, others pointed to the issue of insufficient information shared with the teachers about the underlying philosophy and the goals of the reform. As a result, teachers expressed concerns about their ability to understand the reform's expectations and consequently their ability to positively affect their students' learning (Charalambous & Philippou, 2010).

5 Discussion

In this article we focused on reporting on subject-specific factors interacting with hedonic and eudemonic dimensions of MTWB. We can categorise these broadly according to beliefs and values around six general categories: ability and mindset, discipline and its learning, assessment, pedagogy, identity, autonomy (Figure 3). A tentative synthesis across these broad categories shows an inkling of how mathematics features in the ways that mathematics teachers feel and are able to function in their professional contexts. While colleagues from other subjects might argue that some factors mentioned here are not necessarily unique to mathematics (e.g. ability to realise own didactical vision), unpacking these factors allows us to see how they are shaped by the dichotomized epistemological perspectives of and narratives around mathematics as a discipline (Askew & Venkat, 2017) (summarized in Figure 3). Indeed, using a broad stroke when attempting to construct a subject-

specific picture of the factors associated with MTWB, we start to see resemblance between these and the more general conversations which saturate mathematics education professional and research field.

Figure 3. Narratives around mathematics and their potential influence on MTWB (NB: the green tick signifies positive and the red cross negative factors)



The brief review suggests that feeling happy and professionally fulfilled relates closely to overarching beliefs in what mathematics as a discipline is, what successful mathematics learning looks like and, consequently, how it can be achieved. Unfortunately, as we can infer from the reviewed studies, teachers often experience tensions between their own beliefs and those advocated by others (e.g. parents, curriculum designers, policy makers). These tensions can have a negative effect on MTWB: on how mathematics teachers feel and whether they think they can 'do their job well' (i.e. function well). For example, teachers who aim to support students' conceptual understanding of mathematics through reasoning, can experience feelings of anger, frustration and anxiety, as a result of policy's prioritization of algorithmic thinking or procedural understanding (Charalambous & Philippou, 2010; Jiang et al., 2021) (i.e. pedagogy)

These negative and burdensome feelings, however, do not stem from teacher defiance (as some might want to suggest). They relate to mathematics teachers' understanding that specific conceptualizations of mathematics as a discipline have

significant implications for how individuals feel about mathematics and how they internalize their success (or lack thereof) in the subject into their own identities (Askew & Venkat, 2017; García González & Martínez Sierra, 2020; Yeigh et al., 2023). What is evident from the reviewed studies is that mathematics teachers care deeply about students developing positive and productive relationships with mathematics (Martínez Sierra et al., 2019, 2022; Xenofontos & Andrews, 2020) (i.e. identity), and about students' achieving good conceptual understanding of the subject (i.e. values and identity) (e.g. Martínez Sierra et al., 2022). When teachers feel that they can succeed in these (i.e. they can do their job well), they experience a sense of satisfaction, happiness pride and joy (e.g. Kourti & Potari, 2024; Martínez Sierra et al., 2019, 2022).

Mathematics teachers worry about propagating inappropriate narratives about mathematics (e.g. as a rigid discipline which cares only about accuracy and speed, and which can be mastered only by those born with specific predispositions) which can lead to many highly undesirable consequences (i.e. beliefs, values, identity). One significant example of these can be students' struggles with accuracy and efficiency leading to developing a strong sense of failure, which becomes internalized into a well-known narrative of 'I am not a maths person' (i.e. values and identity). This narrative can lead students to developing mathematics anxiety, and a strong sense of dislike for and avoidance of mathematics, with lifelong consequences (Dowker et al., 2016). These consequences often seep back into the classroom where mathematics teachers become anxious about teaching the subject, afraid to be judged when making errors or being unable to correct them in front of others (García González & Martínez Sierra, 2020) (i.e. beliefs, identity). And so the vicious cycle of fear and of villainizing and holding mathematics responsible continues…

A strong sense of responsibility for consequences of specific mathematics teaching plays a significant role in mathematics teacher emotional burden in their everyday professional life. When teachers feel they can focus on promoting growth mindset as opposed to fixed ability in mathematics (i.e. beliefs), and when they observe their students developing deep conceptual understanding of mathematics (i.e. values), they experience enhanced feelings of job satisfaction and enthusiasm (Shoshani, 2021). On the contrary, those under pressure of prescriptive and limiting reforms which hinder students' conceptual understanding of and interaction with mathematics in meaningful ways (i.e. autonomy) experience frustration, anger and anxiety (Charalambous & Philippou, 2010), e.g. facing external pressures emphasizing rote

learning, memorization, direct instruction and summative assessment as mathematics pedagogies (Andrà et al., 2019; Jiang et al., 2021) (i.e. values, assessment, pedagogy).

Teachers' strong urge to develop positive relationships with mathematics and identity (i.e. identity) was evident not only in relation to students but also to themselves (e.g. Atnafu, 2014; Chatzistamatiou et al., 2014; Xenofontos & Andrews, 2020). For example, teachers emphasized the importance of feeling included in the 'maths community' for their MTWB (e.g. Askew & Venkat, 201; García González & Martínez Sierra, 2020; Yeigh et al., 2023). Additionally, the teachers who might have doubted their mathematical abilities, highly benefited from and appreciated opportunities to participate in meaningful PD initiatives which helped them to expand their subject knowledge and pedagogy, grown in confidence, or develop growth mindset beliefs (e.g. Askew & Venkat, 2017; Hurdle, 2020).

What we can conclude from this review is that it is not only possible but necessary to include mathematics in conversations about MTWB. This is particularly important since, while many issues raised in this review are already well known to mathematics teacher education audience, they remain misunderstood and unappreciated by those outside of the field. While some could argue (and we might agree) that the prominent frameworks of teachers wellbeing, such as Value Alignment Theory of Tiberius (2018) or Self-determination Theory of Deci and Ryan (2008), already allow us to capture many of the issues exposed in this review, what these theories do not afford is a greater and more nuanced understanding of why some struggles of mathematics teachers are particularly difficult to address. For example, one could argue that, in order to feel good and function well within the profession, mathematics teachers need to be afforded autonomy around pedagogical decisions related to mathematics, just like teachers in other subjects do. A solution to this issue should be simple—give teachers autonomy in what they do in the classroom. However, if we interweave this issue with conflicting, socially constructed narratives about mathematics, we can see that achieving real autonomy can be difficult, if across educational and political levels we continue to disagree about what mathematics is, how and why it should be taught, and continue to ignore the damaging consequences that these disagreements can lead to. Mathematics teachers are not trying to be difficult; they are trying to stand up for what they feel is right and important when fulfilling their responsibility for their students as empowered future members of society.

6 Conclusions

Although we do not yet possess definite answers to how to address mathematics teachers' struggles with their wellbeing, the review allows us to communicate that, when it comes to subject-specificity of MTWB, it is not only teacher knowledge, competence, and confidence but also tensions arising from misalignments between dichotomized conceptualizations of mathematics that actively contribute to how mathematics teachers feel and are able to (or not) function in the profession. Unless we consider these more explicitly, we might never be able to address the issue of committed and passionate mathematics teachers struggling in the profession and choosing to pursue other career goals, consequently leaving our classrooms empty and our students growing increasingly anxious in the presence of mathematics.

A meaningful pursuit of possible solutions means welcoming mathematics teachers to the discussion table when considering not only their own classrooms but also general policy and reform in mathematics education. These discussions must involve unpacking underpinning philosophies and assumptions about mathematics and its learning. They must also involve considerations of goals related to mathematics learning and agreeing on appropriate strategies for achieving those. Such an approach might help reconcile the acute tensions that mathematics teachers are experiencing daily when attending to competing goals, while trying to hold their students' best interest at heart.

7 We are left wondering…

It is important to acknowledge that the findings presented here stem from broadly scoped existing research. We accept the fact that much of research in the field of mathematics education is often in pursuit of what we consider to be 'desirable'. This might have implications for the kind of teachers who volunteer to work with us (i.e. those who either share or want to help us fulfil our visions). Consequently, we are left wondering whether it is us as researchers and not teachers themselves who introduce the tensions' bias in what is currently visible in mathematics teacher education research. This, we argue, provides even a stronger warrant for more explicit inductive studies with a wide range of mathematics teachers exploring what mathematics teachers themselves feel their experiences in the professional context are and how these make them feel and function.

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