

Teacher Practices and Classroom Interventions for Reducing Mathematics Anxiety in Secondary Education: A Literature Review

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Abstract

Mathematics anxiety has been a formidable problem in primary education in China, with the high expectations in mathematics alongside the issues of academic pressure, examination demands and student wellbeing. The literature review is a critical examination of the teacher practices and classroom interventions that can help in alleviating mathematics anxiety in secondary-school students with specific reference to changing educational policy situation in China. Using a secondary qualitative approach, relevant scholarly literature and educational policy documents were thematically analysed. The results have shown that teacher backing, formative evaluation, teaching scaffolding, mathematics self-efficacy, constructive feedback and a psychologically secure classroom environment could alleviate anxiety through enhancing perceived competence as well as perceived control in students. Nevertheless, interventions are conditional and policy intervention like Double Reduction does not necessarily remove psychological pressure. The review outlines the necessity of incorporating the anxiety reduction into the everyday mathematics programs, teacher development and school wellbeing interventions.

Keywords: Mathematics Anxiety, Secondary Education, Teacher Practices, Classroom Interventions, Mathematics Self-Efficacy, China, Educational Policy

Introduction

China has a singularly consequential place of mathematics in their school system. It is both considered as the cornerstone of academic discipline, the doorway to a route to science, technology and engineering, as well as an extremely consequence-based element of competitive educational advancement. This exposure is substantial- in 2025, the number of students enrolled in junior secondary education in China was 55.09 million and in regular senior secondary education was 30.40 million and gross enrolment in senior secondary education was 92.0 and national retention rate was 96.1 in nine-year compulsory education (Education by Country, 2026). The resulting large-scale involvement of people in mathematics learning makes the emotional aspect of learning a subject that goes beyond the individual accomplishment. Mathematics anxiety, which manifests itself in worry, tension, nervousness, cognitive intrusion and helplessness in tackling mathematics, may limit student interest in

mathematics at a time when educational systems demand a longer-term and more valued musical competence.

The Chinese case is of interest especially since an outstanding performance in mathematics does not always imply a learning environment that is emotion free. In 2018, PISA ranked Beijing, Shanghai, Jiangsu and Zhejiang on the international level, with an average mathematics score of 591 versus an OECD average of 489; 98% of students in these regions reached Level 2 proficiency and 44% went to Level 5 or higher (OCED, 2026). However, the achievement statistics may mask a wide range of affective relationships that students might have towards mathematics. Evidence demonstrated by PISA 2012 showed mathematics anxiety in Shanghai was about on the average in the challenging OECD although the Shanghai performance was much higher, and later analysis of the Shanghai PISA sample revealed mathematics anxiety related not only to problem-solving but also mathematics performance (Xu & Qi, 2022). Notably, PISA results warn against viewing this relationship in terms of causality: anxiety and achievement may contribute to each other in a reciprocal process where poor performance on mathematics contributes to anxiety and vice versa.

This mutual trend reveals a major issue in the field of education practice. Mathematics anxiety cannot be conceptualised sufficiently as a psychological inadequacy on the part of individual students which necessitates their only requirement as an individual to become more resilient. The classroom climate, the behaviour of teachers as well as the design of instruction students and their perceptions of competence may also influence the perception of mathematical difficulty as a challenge to manage or a reason to fail (Narciss & Alemdag, 2025). The longitudinal evidence was conducted with 1,559 participants (students of secondary-school) and reported reciprocal relationships between mathematics anxiety and mathematics achievement in students and teacher sensitivity as potentially having the effect of decreasing student anxiety in mathematics and mathematics performance (Aldrup, Klusmann & Lüdtke, 2020). More precisely in China, a study involving Shanghai students with PISA 2012 data revealed that the control and value appraisal was correlated with mathematics anxiety and that teacher support, formative assessment and teacher-directed instructions, moderated their interactions under specific conditions, thus alleviating anxiety (OCED, 2026). Recent Chinese findings also indicate that teacher support works via relational and motivational processes: a research of 401 Chinese students found teacher-student relationships and mathematics self-efficacy as vital to mediate between perceived teacher support and mathematics anxiety (Liu *et al.* 2026). Even though that sample was primary and not secondary, the result supports the significance of investigating the classroom practice as a process as social and pedagogical and not focusing on the anxiety as a process primarily intrapersonal.

It has become an issue of more policy interest in China. In 2021, the dismissed reform, entitled Double Reduction tried to decrease excessive homework and academic tutoring out of school, which has created unnecessary strain (SCIO, 2026). Following implementation, the Ministry of Education reported that the proportion of students able to complete written homework in time for adequate sleep increased from 46% to more than 90%, while offline and online academic-training providers declined by 83.8% and 84.1%, respectively (ZHIHU, 2026). It was then addressed in the policy that the quality of education must not be achieved by an uncontrollable workload and pressure on exams. The current Chinese compulsory-education

mathematics curriculum standard also focuses on competency-building, consistency and coherence between educational stages, practical skills, alignment of teaching, learning and testing, and it better specifies how mathematics should be taught, not just what content that needs to be taught (Cai, Wang & Xie, 2025). These reforms are important especially to mathematics anxiety in that they turn the focus of mathematics programs and test results to the context in which the students get mathematical instruction.

The policy's direction is made even clearer. The Ministry of Education in February 2026 released the guidelines on building so-called healthy schools, stating that psychological wellbeing is a precondition to healthy development of students along with physical health (SCIO, 2026). The recommendations include psychological-health education during the teaching and school services, more focused attention during the examination and graduation processes, more significant teacher competence to diagnose and address psychological challenges, and associated wellbeing concerns into the routine educational procedure (Shang, Wang & Zhu, 2025). It is not only administrative of significance. It indicates a new policy logic whereby classroom practice is an element of the prevention infrastructure of student wellbeing. However, mathematics anxiety is not fully evident in this broadened mental-health agenda, as the national policy documents typically discuss the educational strain of exams, psychological and academic wellbeing at a macro level instead of identifying evidence-based instructional actions to tackle subject-specific anxiety.

This forms a significant gap in research. The available literature has provided immense evidence on the correlates of mathematics anxiety, such as self-efficacy, achievement, motivation, teacher support and classroom climate. The literature, however, is still disjointed both in psychological, pedagogical and achievement-oriented traditions. The distribution of Chinese research is also uneven with educational levels. Recent changes have been studied in terms of teacher support among primary pupils whereas data that synthesise teacher practices direct to classroom interventions in secondary schools and their students is still more or less scattered (Zhu & Kaiser, 2022). Also, results of empirical research often find correlations between teacher behaviour and anxiety without sufficiently incorporating it into the consistent description of the interventions in the classroom which seem to be effective, why such interventions can be effective, and in what educational circumstances the effectiveness of such intervention can differ. It is most determined in China where high mathematical achievement, competitive progression and reforms to alleviate academic load are in the same educational setting.

In this regard, this literature review discusses teacher behaviours and classroom activities linked to mathematics anxiety relief in Chinese secondary education and critically refer to the current academic sources instead of expecting that one set of pedagogical practices can be used universally. The review is mindful of the teacher's support and sensitivity, formative and assessment practices, instructional practices, classroom climate, mathematics self-efficacy, student autonomy and interventions intended to decrease maladaptive emotional responses to mathematical tasks. Its importance is that it links two areas of interest which tend to be referred to independently- the enthusiasm of China towards high mathematical achievement and its growing open dedication to student welfare. The synthesis of the existing evidence aims at explaining how teachers can mediate the emotional and the cognitive requirements of mathematics, which are the shortcomings in the current evidence base, and setting the

priorities in classroom practice, teacher development and research. In this regard, the problem of mathematics anxiety is not a marginal wellbeing practice; it is part and parcel of the sustainability and the quality of educational learning of mathematics itself.

Literature Review

Mathematics anxiety has evolved into a significant area of research interest in that it is defined by an ambiguity between emotion and cognition, motivation and academic achievement. Typically, the literature of Lao *et al.* (2025) defined it as a circumstantial affective reaction, both in terms of apprehension, tension and worry when people are exposed to mathematics; however there is still controversy with regard to the best way to establish it as whether it is more of an affective disposition, a mathematical performance anxiety, or a mathematical experience. This theoretical vagueness has implications on the use of education interventions. As per Klee, Buehl & Miller (2022), in case of mathematics anxiety being viewed as a more of a matter that is to be considered as an individual level problem, it is likely to lean more towards coping procedures, confidence construction and emotional control. When it is construed as socially and pedagogically produced, then the focus of attention will centre on the teacher behaviour, classroom interaction, assessment structure and cultural expectations. Zhang *et al.* (2025) stressed that in China, the latter worldview is specifically pertinent as mathematics has a place very high in the order of the school curriculum advancement and the experiences of the subject optimally antagonized with tests, parental standards and future accessibility to students. The literature of Zhu *et al.* (2024) progressively renounces an almost purely deficit-laden narrative of anxious students and instead regards mathematics anxiety as a relational event that occurs as a result of interactions between learners, teachers, curriculum, assessment and educational culture.

The study of Ekeh & Onuike (2025) stressed that mathematics anxiety led to less accessibility to working-memory, avoidance of mathematics-related tasks, decreased persistence, decreased self-efficacy and poor performance. The question about causality is disputed. Caviola *et al.* (2022) argued that systems of anxiousness disrupt cognition and as such, hinder the performance of mathematics especially when facing a challenging task. The study of Zhu *et al.* (2024) indicated that anxiety is already predetermined by a series of experiences of poor activity which undermine the sense of competence and raise the perception of threat. Longitudinal studies are more and more confirming a reciprocal, not a linear meaning: low performance may be increasing anxiety, which, in turn, may increase some more disengagement and poor performance. Such differentiation is the one that is essential in the Chinese secondary-school system. As per Chang, Hsiao & Chiang (2026), the student who has repeated performance failure on maths may seem nervous due to some confidence deficit but the same student may not be able to process mathematical information at all since anxiety eats up attentional resources. Those interventions that concentrate on the emotional reassurance will therefore run the risk of treating the symptom but leave the achievement cycle unaffected, according to Covarrubias (2024). On the other hand, mathematics practice can be aggravated in ways that do not include dealing with emotional reactions, and thus unwillingly perpetuate a cycle. Lao *et al.* (2025) suggested to successfully reducing mathematics anxiety, emotional safety should be considered concomitantly with perceptions of competence and instructional quality.

One of the contextual determinants that is mentioned the most regularly is teacher practice. The study of Horne (2022) found that with encouraging teachers, incidences of anxious reactions are mitigated through conveying tolerance, availability and trust in the ability of the students to have some understanding in mathematics. But the concept of teacher support is often considered overly general. As per Danielson, Furman & Kappes (2024), emotional support, instructional support, autonomy support, feedback, formative assessment and teacher responsiveness are not all the same practices and it is shown that they may have different effects depending on the characteristics of a student and the environment of a classroom setting. The argument has been reinforced by the research of Wang, Xu & Fei (2024) that illustrates that the perception of teacher support could be correlated with the reduction of mathematics anxiety with teacher-student relationships and mathematics self-efficacy. These observations suggest that such an effect of the teacher is not functioning by the mere impartation of help. On the other hand, Luzano (2024) commented, positive classroom relations may change how the student perceives the difficulty in mathematics, that the mistakes may not be as scary and make them more hopeful that one can improve. A significant portion of the Chinese evidence, though, has been produced among younger learners, casting doubt on whether parallel processes are even as powerful among adolescents when facing the comparatively more important tests.

Another theme associated with, but more contentious than, is teacher expectations. Students can be motivated by high expectations, they can be an indicator of intellectual trust and provide encouragement to persist, particularly in situations where expectations are paired with systematic instructions, as emphasised by the literature of Klee, Buehl & Miller (2022). But, when expressed via public comparison, stringent achievement norms or a positive belief about the relative stability of mathematical ability, expectations prove, potentially anxiety-inducing. The Chinese culture of education, as stressed by Jia, Li & Cousineau (2025), makes this a complicated association since high achievement in mathematics was once equated with hard work, academic success and preference to elite educational opportunities. Different psychological effects can then be achieved by having the same instructional message, as commented by Wang, Xu & Fei (2024). When one student is encouraged to work harder, it can be taken in as a constructive reaction and when another student is seen as having inadequate performance. The simplistic assertions that rigorous teaching necessarily yields stronger achievement without being emotionally costly are becoming increasingly criticized, as is the literature. High standards can be used in combination with healthy challenges where the students feel that they have sufficient control over learning, as emphasised by Zhou, Bao & He (2023). However, these same standards can be threatening when the students feel that they do not possess autonomy or when the students see that they make a mistake; this can be interpreted as the inability to accomplish something.

This contradiction can be well explained by theories which focus on the control and value appraisals of the students. Students who feel the control of success at mathematics and who have an attitude towards the subject is intrinsically important and generally less exposed to mathematics anxiety, according to Klee, Buehl & Miller (2022). In contrast, anxiety is more often when mathematics is perceived to be externally applied, cannot be controlled or valued particularly because it makes the difference in grades, tests or opportunities in the future. Research among Shanghai students have also strengthened the topicality of this differentiation in which student perceptions of control-value and their anxiety in mathematics

relate to teaching behaviours which can mediate these effects, as presented in the literature of Liu, Leung & Jiang (2024). A challenging problem can create an effective challenge that students feel confident and supported in and an otherwise low-challenge problem can create anxiety in a situation involving perceived evaluation as a threat. These results present a problem to intervention models which reduce mathematical difficulty as a single factor. The level of anxiety can decrease not due to an ease of mathematics, but the students get more powerful perceptions of control, competence and meaning.

One of the key themes in the literature is thus instructional style. The traditional teacher-centered teaching approach has been negatively criticised in the literature of Lee (2025), but the Chinese culture makes it difficult to simply reject teacher-directed teaching. The characteristics of Chinese mathematics classrooms in the past have been the sequentially of instruction, heavy teacher explanation, repetition and use of procedural fluency. Liu, Leung & Jiang (2024) also depicted such practices to be possibly anxiety-inducing due to the excessive attention to right responses making one more afraid of errors. Wen *et al.* (2026) suggested that explicit instruction, worked examples and systematic scaffolding may, in fact, serve to reduce uncertainty in the case of poorly-grounded learners. The data presented by Gao & Zuo (2025) about Shanghai students also indicate that teacher-directed instruction does not necessarily increase the levels of anxiety but can moderate anxiety in some situations. This means that the structure of instruction should never be the subject of concern. The state of anxiety seems to be more to do with the enactment of the structure, especially whether there is teacher direction in place with explanation, responsiveness, allowing participation and tolerance error, according to Klee, Buehl & Miller (2022). The major difference, thus, lies in the difference between the controlling and structured instruction, which restricts the perceived agency of students and offers a sense of cognitive security, where independence is gradually built up.

Another area that is typified by seeming contradiction is that of formative assessment. As per Yarkwah, Kpotosu & Gbormittah (2024), students are subjected to evaluation in terms of grades, tests and performance in schools, which often becomes a cause of mathematics anxiety. With a relatively high frequency of testing in a setting with a focus on exams, active daily mathematical work may have increased to be repeatable instances of assessments, as stressed by Zhou, Bao & He (2023). However, this is not so in cases where formative assessment is done diagnostically as opposed to being punitively. Contrarily, Ghanizadeh (2026) said, uncertainty and a sense of control can also be reduced with feedback that specifies the progress achieved, demystifies false beliefs and informs that the competence can be enhanced with practice. Study by Lee (2025) included that Shanghai students have proposed formative assessment can buffer matters relating to mathematics apprehension. This result has theoretical significance since it questions the premise that the sole way of reducing anxiety is through assessment reduction. This is most likely to be the role and affective significance of assessment. As per Narciss & Alemdag (2025), evaluation that conveys failure as a fixed characteristic is possibly jeopardizing; evaluation that characterizes mistakes as data to be learned later might establish psychological security. This, therefore, implies that quality of feedback can be a more important factor than frequency of assessment.

This is an argument that is conjoined with error culture and classroom climate. Ergon (2026) stressed, students who have mathematics anxiety usually believe they are afraid of being wrong in front of a crowd, being wrong or judged by their teachers or other students and to prove their negative self-perception. As presented by Caviola *et al.* (2022), classrooms where ridicule, quick questioning society or too much focus on accuracy are the norm can thus support anxious behaviour. In comparison, Covarrubias, (2024) stated, the perceived social cost of failure in classrooms where errors are allowed to be viewed as valid elements of mathematical reasoning may be undermined. The literature of Wang, Xu & Fei (2024) endorsed the usefulness of joint problem solving, discussion and chances to justify arguments, in spite of the fact that the research on its factors on anxiety is not that uniform as teacher-support and self-efficacy. Working together may build up social reassurance, yet on the other hand it may cause anxiety to other students who benchmarked their level against other students with more abilities, as commented by Jia, Li & Cousineau (2025). Group work can thus not be deemed as inherently anxiety-reducing. It is dependent on the makeup of the groups, facilitation by the teacher and the experience of participation being cooperative learning or social evaluation. This is another instance as to why intervention studies ought to go beyond labels like student-centred learning, and compose of the real psychological processes wrought by specific classroom designs.

Among the themes that are most robust through the entire literature is mathematics self-efficacy since confidence in their ability to do the mathematical tasks has been linked again and again to a reduced level of anxiety. It is not a statement that a correlation brings about better results but rather a relationship which should not be oversimplified. Self-efficacy is acquired by mastery experiences, feedback, social persuasion and interpretation of the past performance, as stated by Zakariya (2022). Wen *et al.* (2026) suggested, teachers thus help to alleviate anxiety by creating opportunities in which students will have the opportunity to feel chained success. Unreasonably hard tasks may validate pre-existing notions of incompetence, but unreasonably easy tasks may reveal not so much about the development of competence, as highlighted by Yarkwah, Kpotosu & Gbormittah (2024). A good scaffolding is thus at its heart. More and more, the literature is moving toward development of more complex mathematical exercises out of more challenging tasks with feedback that identifies strategy, instead of just doing so by praising ability. These practices find especially its application in China due to the increasing role of the classical competencies in mathematics in the curriculum reform agenda and the decrease in the focus of memorisation and the performance of mathematical procedures. However, there is still an unequal implementation and especially the use of examination results still influences the perception of teacher efficacy.

This policy, particularly the 2021 Double Reduction, can be viewed as significant since it actively tried to eliminate excessive homework and a problematic off-campus system of academic tutoring in compulsory schooling (Chen & Lin, 2026). Gupta & Zhao (2024) found that this policy had a shift in the ecology of the exterior where mathematics is taught by putting more responsibility on the school and classroom to offer efficient learning and in diminishing the dependence on post-school academic-acceleration. It has significant but non-linear implications to mathematics anxiety. As per Narciss & Alemdag (2025), less homework and commercial tutoring can reduce the fatigue and the direct academic pressure and provide a more favourable environment to the production of emotional wellbeing. Empirical research

by Gao & Zuo (2025) has presented that, when academic load is reduced, which can be perceived, it may not always reduce the perceptions of burdens on students. Even though formal workloads may have dropped, academic competition, the expectations of parents as well as internalised norms of achievement may continue to persist. Ghanizadeh (2026) emphasised, a growing difference between objective burden and subjective burden emerges in terms of the literature. In the case of mathematics anxiety, the difference plays a role especially since the intervention has the potential to decrease the amount of exercises but retains the aspect of fear of making mistakes based on low grades or failure to perform as expected.

The Double Reduction policy also brings an undone contradiction of teacher-side. Hanford of less homework and tutoring do not necessarily yield more effective pedagogy. The teachers are supposed to enhance classroom effectiveness, create more quality work, offer dissimilar bolstering to learners and accommodate more varied learners in school settings, as presented in the literature of Chen & Lin (2026). The occupational anxiety of the teachers, in terms of policy implementation, has been reported in the study of Jia, Li & Cousineau (2025), including in part due to the lack of institutional resources to support new expectations, or to professional support or accommodation to new assessment cultures. As highlighted by Zakariya (2022), this is important to student mathematics anxiety since the emotional climate of students and teacher wellbeing are likely to be dependent. According to Gupta & Zhao (2024), unless the teacher acts deliberately to imitate urgency and intensity in classroom dynamics, they might unwillingly recreate them because the individual is working under a sense of urgency, too much work, or too much performance pressure. Danielson, Furman & Kappes (2024) claimed, a policy with the aim of decreasing student anxiety may not yield much when the implementation approaches a greater strain on the teacher. It is essential to go beyond considering Double Reduction in terms of homework volume and tutoring involvement and addressing the quality of classroom interactions in the post-implementation of the policy.

This change is further reinforced by the 2022 standards of compulsory-education mathematical curriculum which accentuate more mathematical core competencies, application, reasoning, consistent progression and increased correspondence between teaching, learning and assessment (Chen & Lin, 2026). As per Lee (2025), on the side of mathematics-anxiety, this policy orientation offers hope since it opens a conceptual room in which the learning setting allows the students to learn mathematics as opposed to memorizing processes. The problem is however, in the transfer between policy aspiration, and classroom practice. Rhetoric that is based on competencies is not by necessity a replacement of behaviour-based on examination. Instructors can choose the style of questioning and reasoning, but still with the emphasis laid on speed, right answers and test preparation (Liu, Leung & Jiang, 2024). The significance of this type of policy-practice gap lies especially in the effectiveness of mathematics anxiety in being shaped by neither formal curriculum statements nor students informal exposure to mathematical authority, evaluation and difficulty in their daily encounters with mathematics. Conditions that come with the reform of policy are not able to ensure that the emotional architecture of learning in classrooms will adapt with it.

Evidence base in the literature on interventions is thus fragmented. As per Wen *et al.* (2026) all cognitive-behavioural, expressive, relaxation, growth-oriented, expressive and message modelling, mindfulness, collaborative learning, online learning interventions, peer support and mathematics self-efficacy interventions have all received academic interest. However, Yarkwah, Kpotosu & Gbormittah (2024) stressed that the effectiveness of intervention is quite variable, and most of the studies are short, have comparatively small samples or assess anxiety directly after the intervention, but not regarding long-term changes. Nearly no agreement exists as well whether general anxiety-reduction methods need to be incorporated into mathematics education or be provided as separate psychological programmes. As a classroom, stand-alone intervention might prove challenging to institutionalise especially in a school where teachers are faced with curriculum and assessment requirements. Intervention based on pedagogy seems more sustainable since it alters the daily classroom experiences, but they presuppose the presence of psychological and instructional skills in teachers.

Another emerging debate is provided by technology. Differentiation of practice and the ability to practice privately with immediate feedback, such as digital platforms, adaptive learning systems and computer-based collaborative environments, could lead to a decrease in embarrassment caused by a public mistake, as presented by Narciss & Alemdag (2025). Simultaneously, Ergan (2026) highlighted that added digital surveillance can enhance the surveillance of performances, and the use of algorithms can replicate anxiety as students receive constant reminders of ranking or incompetence. The literature of Caviola *et al.* (2022) commented that this situation is even more complicated by Chinese educational digitisation, which means that the adoption of technologies is done concomitantly with the policies of efficiency and high-quality learning that are posed under a strong emphasis. Covarrubias (2024) stressed, technology can thus not be comprehended as problem-solving in itself. Its role in the decrease of anxiety is determined by its ability and efforts to make students feel more autonomous and competent or merely more frequent and observable in assessment.

One weakness that has existed throughout the literature is the lack of focus on heterogeneity. According to Li & Qi (2025), gender, level of achievement, socioeconomic background, type of school, geographical or educational stage does not exhibit the same result on mathematical anxiety. There is a high degree of regional and institutional diversity, as Ding & Zou (2026) highlighted that in Chinese education and pressures might be in schools with high levels of competition in an urban area or less-resourced environments. There is also a tendency in the literature to consider the group of Chinese students as a relatively homogenous group, which, however, has a lot of differences across provinces, municipalities or school communities. This risks when findings of context are ascribed to national culture. On the same note, Gupta & Zhao (2024) focused on cross sectional self-reports indicating that it is hard to differentiate between lasting anxiety and interim anxiety due to a specific examination or anxiety caused by a certain classroom event. More compelling evidence would be possible with longitudinal designs, multi-source measures and more combinations of student perceptions with teacher practices and observed classroom behaviour.

The age difference is of particular interest. Much of the mathematics-anxiety research done in China is based on primary-school children, and adolescence is an especially significant stage since mathematics is increasingly more clearly differentiated academic-consequential and

examination-focused. As per Lao *et al.* (2025) secondary students can be introduced to a greater amount of abstract content, pressure of ranks and greater concerns related to educational pathways. The results of the primary education also cannot be automatically substituted at the junior or senior secondary education (Chang, Hsiao & Chiang, 2026). Decreasing the number of studies on the particular intervention studies focusing on the secondary level undermines the confidence in the effective practices of teachers at such a stage. It also restricts the ability to draw a line between interventions that young learners are able to receive, and those that adolescents with more established mathematics identities and greater sensitivity to social comparison can receive.

As shown in the literature of Danielson, Furman & Kappes (2024), there is considerable consensus that mathematics anxiety cannot merely be seen as an internal weakness residing in the student. Anxiety can be aggravated or lessened by the teacher support, the classroom climate, self-efficacy, how the instruction is organised and assessment practices are applied, as highlighted by Wang, Xu & Fei (2024). Meanwhile, there are still major contradictions in relation to the priorities of which pedagogical strategies to focus on and attitudes on the adverse nature of rigorous, teacher-centered and assessment-rich settings. These binaries are misinformed as indicated in Chinese evidence. Luzano (2024) commented that, direction by teachers may help anxious students where it is clear and scaffold; assessment may reduce anxiety where it is operated formatively; high expectations may motivate where the student feels that they have control and are supported and policy-led reductions can improve the wellbeing of students without removing anxiety where psychological competition persists. Conditional, and not categorical, is the most justifiable treatment and interpretation of mathematics anxiety can be influenced by the relations between pedagogical practice, student evaluation, dynamics of achievement and the educational environment at large.

This gap, in central part, is not lack of studies in the area of mathematics anxiety but lack of satisfactorily synthesized approach between pedagogical work by teachers, classroom intervention and the rapidly changing educational policy atmosphere in China within the Chinese secondary school system. Previous research often isolates psychological predictors, personal interventions or policy consequences, and its understanding of interaction between the elements in the daily mathematics classes is wanting. Critical synthesis of the feasibility of the interventions, which were found to be effective in controlled or small-scale studies, to be applied in the curricular or examination demands and workload situations that Chinese secondary educators face is also lacking. A more robust evidence base thus necessitates focus on whether an intervention can reduce anxiety, but also on how it functions, the behaviours necessary in practice by teachers, the students most responsive to it, and the institutional circumstances that should enable it to be maintained. It follows that the conceptual core of this literature review lies in the fact that the attainment of the reduction of mathematics anxiety in China cannot be done either by emotional regulation programmes or workload reduction, but rather by the reorganisation of pedagogical environments such that mathematical difficulty, assessment and achievement are restructured in a manner that challenge is rigorous without becoming psychologically threatening.

Methodology

The research design embraced in the study is a secondary literature review design whereby a critical examination of teacher practice and classroom intervention related to the reduction

of mathematics anxiety among secondary school students is conducted, with specific reference to the Chinese educational setting. Secondary research is suitable since the research aims to develop and explain an already existing base of both empirical and theoretical research data, not to produce primary data on participants (Cheong *et al.* 2023). The academic journal databases as well as the search platform were used to identify relevant literature by combining keywords such as mathematics anxiety, mathematics anxiety in secondary school, teaching strategies, classroom-based interventions, mathematics self-efficacy, teacher assistance, China, and Chinese secondary students, Double Reduction, mathematics education policy. More emphasis was placed on peer-reviewed empirical research, systematic reviews, theoretical journals and authoritative Chinese education-policy reports. The literature on primary education, on university students, on clinical anxiety not connected to mathematics, and on literature with no substantive relevance to classroom practice was eliminated unless it contributed to the theoretical or contextual discussion in an important way.

The collected literature was analysed through qualitative thematic synthesis. Comparisons of studies were done as opposed to individual outcomes as the results were seen as recurring themes, areas of convergence, contradictions, and differences in contexts. Special analysis focus has been provided on the support to the teachers, instructional methods, assessment and feedback, classroom atmosphere, student self-efficacy, tolerance to errors, academic pressure and policy related factors and impact of mathematics anxiety (Naeem *et al.* 2023). The results of Chinese studies were taken into consideration with the context of the broader international literature in order to identify the areas in which evidence is situational, and those in which more general trends seem relevant in the context of secondary mathematics education in China. The synthesis also looked at the correlation between classroom level practices with national changes to education especially the Double Reduction policy and the competency based reforms in the mathematics facet of the curriculum (Wolgemuth, Guyotte & Shelton, 2024). Such a methodology allows the review to transcend their descriptive reporting towards an interpretive estimation of how, why and under what circumstances, teacher practices and in-classroom interventions can help alleviate mathematics anxiety among the Chinese secondary-school students.

Results and Discussion

Theme 1: Teacher support, classroom relationships and the emotional conditions of mathematics learning

The literature consistently identifies teacher support as one of the most consequential classroom-level influences on mathematics anxiety, but the evidence does not support a narrow interpretation of support as simply helping students when they encounter difficult questions. In the Chinese context, the research of Liu *et al.* (2026) highlighted that teacher support operates through several interconnected mechanisms: the quality of teacher–student relationships, the extent to which students perceive teachers as approachable, the emotional tone of feedback, and the degree to which students believe that mistakes can be discussed without humiliation. Evidence from the research of Cai, Wang & Xie (2025) indicates that perceived teacher support is negatively associated with mathematics anxiety, while teacher–student relationships and mathematics self-efficacy help explain this relationship. Lao *et al.* (2025) suggested that the relationship is dynamic rather than unidirectional, with perceived support, engagement and mathematics anxiety influencing one another over time.

More recent research with 1,314 Chinese high-school students is particularly significant because it demonstrates meaningful variation in students' perceived levels of teacher support within a highly standardised educational system (OCED, 2026). In the literature of Xu & Qi (2022), the existence of low-, medium- and high-support profiles suggests that national curricular uniformity does not produce uniform classroom experiences. Similarly Liu *et al.* (2026) stated, students exposed to stronger teacher support reported more favourable mathematics-related engagement and attitudes and lower anxiety, indicating that teacher behaviour remains a differentiating factor even where curricula, examinations and institutional expectations are broadly shared.

The literature nevertheless complicates the assumption that increasing teacher support will automatically reduce anxiety. As per Liu *et al.* (2026), excessive assistance can become controlling, inadvertently communicating to students that they are incapable of solving problems independently. What appears as support from the teacher's perspective may therefore be interpreted as a signal of low competence by the learner. The more useful distinction is between autonomy-supportive and dependence-producing assistance. Klee, Buehl & Miller (2022) highlighted that in Chinese secondary classrooms, where teachers often occupy a highly authoritative position and mathematical performance carries substantial consequences for educational progression, this distinction becomes particularly important. According to Zhang *et al.* (2025), teacher support is most likely to be anxiety-reducing where it develops competence without removing intellectual challenge. The strongest evidence presented by Caviola *et al.* (2022) favours relational security combined with cognitive demand: students require teachers who are responsive to emotional difficulty but who do not lower expectations unnecessarily. This interpretation aligns with Chinese evidence showing that teacher behaviours interact with students' control and value appraisals, as per Chang, Hsiao & Chiang (2026). Support is consequential partly because it changes how students interpret their own capacity to succeed.

Teacher–student relationships also require a more critical reading. Covarrubias (2024) focused on positive relationships as inherently beneficial, yet the effects depend on whether relational closeness is translated into greater psychological safety during mathematics learning. According to Horne (2022), a warm relationship outside mathematics does not necessarily eliminate fear of public failure during mathematical questioning or assessment. Conversely, Danielson, Furman & Kappes (2024) stated, a teacher who is perceived as demanding may still reduce anxiety where expectations are communicated consistently and mistakes are handled constructively. The evidence from the study of Wang, Xu & Fei (2024) pointed towards classroom relational quality rather than friendliness as the more meaningful construct. Luzano (2024) focused particularly in secondary education, where students' sensitivity to social judgement increases, and teachers become important gatekeepers of classroom status. Public comparison, sarcasm and visible differentiation between “strong” and “weak” mathematicians can undermine the protective effects of general teacher support (Jia, Li & Cousineau, 2025). An important implication is that interventions should target specific teacher behaviours during mathematical activity rather than relying on broad prescriptions to “build positive relationships.”

Theme 2: Instructional approach: direct teaching, inquiry and the problem of false pedagogical binaries

The relationship between instructional approach and mathematics anxiety presents one of the clearest contradictions in Chinese literature. Direct instruction has been criticised in the study of Zhou, Bao & He (2023), as highly teacher-controlled lessons can emphasise speed, accuracy and correct procedures, potentially increasing evaluative threat. At the same time, direct explanation, worked examples and carefully sequenced demonstrations can provide cognitive structure for students who experience mathematics as confusing or unpredictable, as conveyed by Liu, Leung & Jiang (2024). Evidence from the literature of Lee (2025) confirmed that the relationship cannot be reduced to “traditional teaching causes anxiety.” Gupta & Zhao (2024) found that teacher-directed instruction significantly moderated relationships between students’ control-value appraisals and mathematics anxiety and could contribute to reducing anxiety under certain conditions. This finding is theoretically important because it challenges the assumption that student-centred instruction is always emotionally superior. On the other hand, Li & Qi (2025) noted, for an anxious student with weak foundational knowledge, an entirely open-ended problem-solving task may increase rather than reduce uncertainty. Structured teacher guidance can therefore function as a form of emotional as well as cognitive scaffolding.

However, this does not amount to an endorsement of conventional teacher-centred instruction in general. Research involving 221 senior secondary mathematics teachers in Guangdong found that inquiry-based instruction was positively associated with teachers’ enjoyment and satisfaction and negatively associated with anger and anxiety, whereas direct instruction showed positive relationships with negative teacher emotions (Education by Country, 2026). The findings are important because teacher emotion itself influences classroom practice. A teacher operating with greater anxiety or frustration may provide less exploratory space, become more corrective and rely more heavily on direct control, creating an emotional feedback loop between teacher experience and student classroom experience, according to the statement of Aldrup, Klusmann & Lüdtke (2020). The literature of Caviola *et al.* (2022) thus supports a more nuanced position: the problem is not direct instruction as a category but forms of instruction that communicate low student agency, excessive performance surveillance or intolerance of error.

Inquiry-based approaches also have limitations. Inquiry can increase ownership, reasoning and conceptual engagement, but its effectiveness depends heavily on the quality of teacher scaffolding, as presented by Zhou, Bao & He (2023). Students with low prior attainment or severe mathematics anxiety may find unstructured discovery demanding, particularly when they lack confidence in how to begin a task. According to Ghanizadeh (2026), highly anxious students can interpret uncertainty as evidence of inability rather than as an invitation to explore. Narciss & Alemdag (2025) suggested that the strongest instructional model is neither rigid direct instruction nor minimally guided inquiry, but adaptive teaching in which explicit explanation, guided practice, questioning, exploration and consolidation are combined according to students’ needs. The Chinese curriculum reform agenda, particularly the 2022 mathematics curriculum standards, provides policy support for this more integrated approach by emphasising mathematics core competencies and reform of teaching and learning rather than simple curriculum coverage (Ergan, 2026). Yet a persistent implementation tension

remains: curriculum standards may encourage reasoning and competency development while examination systems continue to reward rapid and accurate performance.

Theme 3: Assessment, formative feedback and examination pressure

Assessment is perhaps the domain in which China's policy reforms and classroom realities most visibly intersect with mathematics anxiety. The literature of Lao *et al.* (2025) strongly associates mathematics anxiety with evaluative situations, especially where students perceive that poor performance will produce meaningful educational consequences. In China, mathematics is closely embedded in examination-oriented progression, making assessment difficult to separate from students' broader educational identities, as highlighted in the literature of Zhang *et al.* (2025). The anxiety generated by a mathematics test may therefore involve more than fear of a single assessment; it can reflect concern about ranking, parental expectations, access to academic pathways and perceptions of future competence (Ekeh & Onuike, 2025). The resulting pressure makes mathematics anxiety particularly resistant to purely individual-level interventions.

Evidence from Shanghai nevertheless demonstrates that assessment itself is not uniformly harmful. Formative assessment was found to moderate appraisal-related antecedents of mathematics anxiety, suggesting that assessment can become protective when its primary function is diagnostic and developmental rather than punitive (Horne, 2022). This distinction is central. Summative assessment compresses a student's performance into a judgement, whereas formative assessment can externalise difficulty as information about the learning process (Danielson, Furman & Kappes, 2024). As per Wang, Xu & Fei (2024), feedback that identifies misconceptions, clarifies next steps and recognises improvement can strengthen perceived control. The implication is not that assessment should be eliminated but that its psychological function should be redesigned.

China's Double Reduction policy provides a significant institutional context for interpreting these findings. The policy substantially reduced homework demands and regulated academic tutoring during compulsory education; official reporting indicated that the proportion of students completing written homework in time for adequate sleep increased from 46% before implementation to more than 90%, while offline and online academic-training providers declined by 83.8% and 84.1%, respectively (ZHIHU, 2026). These changes represent a meaningful reduction in measurable external workload. Yet reduced workload should not be equated with reduced mathematics anxiety. As per Luzano (2024) anxiety can migrate from the quantity of work to the perceived consequences of performance. A student may complete fewer exercises yet remain preoccupied with examination results, class ranking or parental expectations, as highlighted by Jia, Li & Cousineau (2025). The policy therefore addresses an important structural condition but does not, by itself, alter the emotional meaning of mathematics.

The same contradiction appears in examination reform. China has introduced stronger controls over examination difficulty in compulsory education and moved towards more appropriate grading and use of results, reflecting a policy objective of reducing excessive testing pressure (Zhou, Bao & He, 2023). Such measures create institutional space for healthier classroom practices, but their effectiveness depends on whether teachers, schools and families continue to interpret achievement through highly competitive metrics, as

emphasised by Liu, Leung & Jiang (2024). Mathematics anxiety is particularly sensitive to these contradictions because mathematics often retains symbolic importance as a marker of academic capability. The literature of Yarkwah, Kpotosu & Gbormittah (2024) consequently suggests that policy reform needs to be understood at two levels: reducing the objective intensity of assessment and transforming the subjective meaning assigned to results.

Theme 4: Self-efficacy, control-value appraisals and the achievement–anxiety cycle

The most coherent psychological explanation emerging from the literature concerns students' beliefs about control and competence. As presented by Wen *et al.* (2026), students who believe that mathematical outcomes are controllable and who attach intrinsic value to mathematical learning tend to experience lower anxiety, whereas anxiety rises where mathematics is perceived as externally imposed and strongly associated with consequences beyond the learning process. Chinese evidence from Shanghai demonstrates that action control, outcome control and intrinsic value negatively predicted mathematics anxiety, whereas extrinsic value intensified it (Liu, Leung & Jiang, 2024). Crucially, Lee (2025) commented, teacher support, formative assessment and teacher-directed instruction moderated these relationships. The implication is that teacher practices do not merely affect anxiety directly, which is also presented in the study of Gao & Zuo (2025). They shape the appraisals through which students interpret mathematical experiences.

This helps explain why self-efficacy is repeatedly identified as a key mechanism. According to Yarkwah, Kpotosu & Gbormittah (2024), a student who believes that failure results from insufficient effort or an inappropriate strategy is more likely to persist than a student who interprets failure as proof of fixed mathematical inability. Yet the literature should resist reducing self-efficacy to positive thinking. Confidence disconnected from actual competence is unlikely to withstand repeated failure. Ghanizadeh (2026) emphasised, effective interventions therefore require authentic mastery experiences. Teachers need to calibrate difficulty carefully, provide opportunities for success that are intellectually meaningful, and give feedback that focuses on strategy, reasoning and progress, as commented by Ergan (2026). In this respect, mathematics-anxiety reduction becomes inseparable from good mathematics teaching.

The relationship between anxiety and achievement is also reciprocal. Lower achievement can undermine self-efficacy, which increases anxiety and avoidance; heightened anxiety can then impair attention and working memory, producing additional errors and weaker performance, as stressed by Zakariya (2022). This cycle is especially dangerous in secondary education because students' mathematical identities become increasingly consolidated. According to Chen & Lin (2026), students who repeatedly conclude that mathematics is “not for them” may begin to avoid optional mathematical activities, suppress participation and disengage from difficult questions. Classroom interventions should therefore intervene early in this cycle rather than waiting until anxiety has become entrenched, as stated by Li & Qi (2025). The evidence also indicates why purely emotional interventions can have limited durability: without accompanying improvements in mathematical understanding and perceived control, temporary reductions in anxiety may not survive subsequent academic difficulty.

Theme 5: Error climate, participation and psychological safety

A further theme concerns the treatment of mistakes. Mathematics anxiety is frequently sustained by the anticipation of public failure, making classroom error culture a practical intervention target. As per Danielson, Furman & Kappes (2024), a classroom in which errors are interpreted as useful evidence for reasoning differs fundamentally from one in which incorrect answers are treated as signs of inadequate ability. In highly evaluative environments, students may adopt avoidance strategies: remaining silent, copying solutions, avoiding difficult problems or allowing classmates to answer instead, as conveyed by Wang, Xu & Fei (2024). Such behaviours can produce a misleading appearance of compliance while reducing meaningful mathematical engagement.

The literature of Liu *et al.* (2026) supported the use of collaborative discussion, guided questioning, worked examples and opportunities to explain mathematical thinking, but it also warns against assuming that participation structures are universally beneficial. As per Lao *et al.* (2025), group work may reduce anxiety by distributing responsibility and increasing peer support, yet it may also expose lower-performing students to unfavourable comparison. Similarly, Zhang *et al.* (2025) commented, public questioning can encourage active engagement but can become threatening when teachers rapidly demand answers or visibly praise only the fastest students. Consequently, Caviola *et al.* (2022) suggested that psychological safety must be designed into the interactional details of lessons. The relevant question is not whether a teacher uses group work, discussion or questioning, but whether these practices allow students to participate without making socially costly mistakes.

The Chinese context gives this issue particular significance because educational success has historically been accompanied by strong social comparison and examination competition. Covarrubias (2024) described that student-centred may reproduce competitive norms if students are persistently ranked through visible performance. On the same note, Horne (2022) stated that reducing mathematics anxiety therefore requires a shift in the social meaning of competence: mathematical capability should be presented as developable and multidimensional rather than as a fixed hierarchy of fast and slow learners. As per Luzano (2024) this principle corresponds with the competency-oriented direction of the revised mathematics curriculum, but the literature of Zhou, Bao & He (2023) indicated that policy language alone cannot transform classroom culture. Teachers require concrete professional learning on questioning, feedback, error treatment and differentiated instruction if curriculum reform is to alter students' emotional experiences of mathematics.

Theme 6: Teacher wellbeing, policy implementation and the limits of classroom-level intervention

Perhaps the most underdeveloped aspect of the literature concerns teachers themselves. Mathematics-anxiety interventions are frequently framed around students, although teachers operate within institutional systems that shape the emotional conditions of teaching, as conveyed in the literature of Lee (2025). Evidence from Jia, Li & Cousineau (2025) showed in the context of Chinese senior secondary mathematics teachers, which presents that teacher emotions are closely associated with instructional practice. Inquiry-oriented teaching is linked to more positive emotional experiences, while direct instruction is associated with greater teacher anger and anxiety, according to Gao & Zuo (2025). The

implication is that student-focused interventions cannot be evaluated independently of teachers' emotional and professional circumstances.

This becomes particularly salient following Double Reduction. Research involving 45 Chinese primary and junior-high teachers found occupational anxiety associated with uncertainty, role conflict, perceived learning risks for students and an incomplete fit between policy implementation and the existing educational ecology (ZHIHU, 2026). The finding exposes a policy paradox. A reform designed partly to reduce students' educational pressure may increase teachers' responsibility for producing effective learning within fewer opportunities for external academic supplementation, as stressed by Lao *et al.* (2025). Where teachers feel insufficiently prepared or supported, classroom pressure may not disappear; it can be redistributed from students' homework and tutoring schedules to teachers' lesson efficiency, monitoring and accountability, as commented by Klee, Buehl & Miller (2022).

This has direct implications for mathematics anxiety. Teachers who feel under pressure may become more likely to prioritise syllabus completion, correct answers and examination readiness, precisely the behaviours that can intensify evaluative threat, as highlighted by Zhu *et al.* (2024). The issue is therefore not simply whether teachers have knowledge of mathematics-anxiety interventions but whether the organisational environment permits sustained use of such practices. Professional development should combine mathematics pedagogy with understanding of student emotion, formative assessment, differentiated instruction and classroom interaction. School leadership also matters because teachers cannot independently resolve tensions created by assessment expectations, curriculum pacing and parental demands.

Discussion

The results show that math anxiety cannot be decreased based on one intervention. Interdependent influences are teacher support, instructional structure, and formative assessment, self-efficacy, and classroom climate and policy conditions. Psychological safety, competence and control perceived by students can be enhanced by supportive teachers and anxiety reinforced by lack of control in assessment, too much comparison and fear of failure. The evidence thus disproves simplistic assumptions that the problem will be solved by just reducing homework, implementing inquiry-based teaching or simply offering psychological assistance (Danielson, Furman & Kappes, 2024). Reform opportunities are of importance in secondary education in China. More objective academic load has been eliminated with such a policy as Double Reduction and the 2022 mathematics curriculum focuses on competency-based learning and the overall improvement of education (Chen & Lin, 2026). However, there is a gap that persists in the intentions of the policy and implementation in the classrooms. Reducing mathematics-anxiety needs to be incorporated in teacher development, in practice of formative assessment, classroom interaction, and school wellbeing practices. Longitudinal secondary-school research, rural-urban comparisons and extended intervention research are in priority in the future research. Mathematics anxiety is to be taken as an educational-system problem manifested in the affective life of the students. Best practice involves intensive teaching in mathematics in conjunction with scaffolding, effective feedback, tolerance of errors and productive opportunity to improve.

Conclusion and Recommendations

This review arrives at the conclusion that, instead of individual characteristics alone, the interaction of classroom practices, psychological processes and pressures of wider education in general influence mathematics anxiety in Chinese secondary-school students. Self-efficacy and perceived control can be reinforced with the help of teacher support, constructive feedback, proper instructional structure, formative assessment and experience of mathematical success, whereas over-comparison, fear of mistakes, and high stakes testing can enhance the feeling of anxiety. The policy of Double Reduction and Competency-based Curriculum Reform in China helps create very favourable conditions to tackle these issues, however policy change is not enough to bring change to the classroom level.

Professional development activities that teachers are supposed to undergo in terms of mathematics anxiety, emotionally supportive and encouraging communication, differentiated instruction, formative feedback and constructive error treatment should be guided. The enhancement of classroom based wellbeing and performance comparison that is not necessary should be encouraged in schools. It should be gauged with the focus on developmental feedback and achievement measurement (Lee, 2025). Students with on-going anxiety are also advised to have increased coordination between mathematics teachers and pastoral staff and school psychologists (Yarkwah, Kpotosu & Gbormittah, 2024). The future study needs to be longitudinal and mixed-methodological, to compare between the rural and urban and regional variation and analyze the effectiveness and viability of the classroom intervention in the Chinese secondary school system in the long-run.

Novelty & Contribution of Study

This study is novel in its combined analysis of mathematics anxiety as a socially and pedagogically situated phenomenon in Chinese secondary school. Previous studies have typically analysed mathematics anxiety with individual level variables like self-efficacy, motivation and academic attainment but teacher-support and classroom climate and teaching practices have long been disparate among educational and psychological applications (Chang *et al.* 2026). This research is a collection of these strands under the lens of how the teacher behaviours and in-classroom operations can influence the emotional reactions of students toward mathematics in the particular institutional scenario of the Chinese secondary school. Its importance is enhanced further with its location in terms of mathematics anxiety and the ongoing focus on mathematical performance, educational competition, and curriculum change and learner welfare in China. Instead of viewing anxiety as an individual deficiency, the study takes into account how real-life interactions in the classroom and pedagogical conditions can either alleviate or reinforce anxiety.

In the social sciences, the research has a role to play in linking the sociology of the classroom and teacher practice in one analytical lens with educational psychology. It expands knowledge of mathematics anxiety beyond the traditional view of mathematics anxiety as an individual psychological outcome to include the impact of social relationships, instructional structure and perceived classroom experiences. The review also offers a context-specific synthesis of evidence that is pertinent to Chinese secondary education, in which the high academic expectations are alongside policy responses that are aimed at counteracting the impacts of excessive educational pressure and promoting student wellbeing. It is a significant contribution in that it correlates the individual classroom level processes with the broader

educational and institutional circumstances, indicating how an individual emotional experience is integrated into the social systems. These findings are to facilitate increased theoretically informed teacher practice, work in the classroom and future empirical research on subject specific anxiety, and form part of the wider social science debate on whether educational environments drive student behaviour, wellbeing and engagement.

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