Comparative effects of three interventions to reduce burnout among Physical Education teachers in special schools in Fujian province

Efectos comparativos de tres intervenciones para reducir el agotamiento laboral de los profesores de Educación Física en escuelas especiales en la provincia de Fujian

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Abstract

Introduction and Objective: Burnout is a significant occupational hazard among physical education (PE) teachers in special schools. This study aimed to compare the effectiveness of three structured interventions—Mindfulness-Based Stress Reduction for Educators (MBSR-E), Job Crafting with Peer Support (JC+CoP), and Adaptive-PE Competence Boost (APC-Boost)—in reducing burnout symptoms among PE teachers in Fujian province, China.
Methodology: A three-arm randomized controlled trial was conducted over eight weeks with assessments at baseline, mid-intervention, post-intervention, and four-week follow-up. Burnout was measured using the Maslach Burnout Inventory–Educators Survey (Chinese version).
Results: All interventions produced reductions in Emotional Exhaustion (EE) and Depersonalization (DP), and increases in Personal Accomplishment (PA). MBSR-E and JC+CoP showed the largest improvements in EE and DP, while APC-Boost showed more modest but relevant improvements, particularly in PA. At follow-up, MBSR-E and JC+CoP maintained significant effects, while APC-Boost showed partial regression.
Conclusions: Interventions targeting emotional regulation and peer support demonstrated more lasting effects than competence-based approaches alone. Integrated programs combining mindfulness, collaborative networks, and professional skill development are recommended to reduce teacher burnout effectively and sustainably.

Keywords

Burnout, physical education teachers, special schools, mindfulness, job crafting, competence development, randomized controlled trial.

Resumen

Introducción y Objetivo: El agotamiento laboral es un riesgo significativo entre los profesores de educación física en escuelas especiales. Este estudio tuvo como objetivo comparar la efectividad de tres intervenciones estructuradas—Reducción de Estrés Basada en Mindfulness (MBSR-E), Rediseño del Trabajo con Apoyo entre Pares (JC+CoP) y Mejora de Competencias en Educación Física Adaptada (APC-Boost)—para reducir los síntomas de agotamiento en docentes de Fujian, China.
Metodología: Se llevó a cabo un ensayo controlado aleatorizado de tres grupos durante ocho semanas, con evaluaciones en cuatro momentos: inicio, mitad, postintervención y seguimiento. El agotamiento se midió utilizando el Inventario de Burnout de Maslach–Encuesta para Educadores (versión china).
Resultados: Las tres intervenciones redujeron el agotamiento emocional (EE) y la despersonalización (DP), e incrementaron el logro personal (PA). MBSR-E y JC+CoP lograron las mayores mejoras en EE y DP, mientras que APC-Boost mostró mejoras más moderadas, especialmente en PA. En el seguimiento, MBSR-E y JC+CoP mantuvieron efectos significativos, mientras que APC-Boost mostró regresión parcial.
Conclusiones: Las intervenciones centradas en la regulación emocional y el apoyo entre pares mostraron efectos más duraderos que aquellas centradas únicamente en las competencias. Se recomienda aplicar programas integrados que combinen mindfulness, redes colaborativas y desarrollo profesional para reducir el agotamiento docente de manera efectiva y sostenible.

Palabras clave

Burnout, profesores de educación física, escuelas especiales, mindfulness, habilidades laborales, desarrollo de competencias, ensayos controlados aleatorios.

Introduction

Burnout has been increasingly recognised as a global occupational hazard in education, defined as a multidimensional syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment[1]. Within the teaching profession, burnout undermines teacher well-being, job satisfaction, and student learning outcomes[2]. The World Health Organisation has classified burnout as an occupational phenomenon in ICD-11, linking it to unmanaged workplace stress. Its prevalence among teachers ranges widely, from 25% to 74%, depending on contextual and methodological factors[2]. PE teachers are particularly vulnerable due to their dual instructional and supervisory roles, physical demands, extracurricular duties, and high expectations from both schools and parents[3]. The risk is magnified in special education contexts, where PE teachers must adapt lessons for students with disabilities, navigate role conflicts, and cope with insufficient institutional support[4].

Research in China reveals that special school PE teachers encounter unique stressors, including role ambiguity, excessive workload, low social status, and high emotional labour requirements. Surveys suggest that 37.9% of special education teachers consider leaving the profession, with burnout being a major driver[4]. Policy reforms, such as the Special Education Enhancement Plan (2014–2020) and the 14th Five-Year Plan for Special Education (2021), aimed to enhance teacher professional development. Yet, rising demands without adequate resources have intensified stress and workload. International research also highlights widespread psychological risks. A systematic review reported stress levels between 8.3% and 87.1%, anxiety between 38% and 41%, and depression between 4% and 77% among teachers worldwide[2]. These high prevalence rates highlight the urgent need for preventive and remedial interventions tailored to educational contexts.

Problem statement

Despite evidence of burnout's severity, few intervention studies target PE teachers in special schools. Most interventions, such as mindfulness programs, resilience training, or social support systems, have been applied in general education or healthcare[5,6]. Comparative research on multiple intervention models is scarce, particularly in China. Furthermore, many studies lack longitudinal follow-up, leaving uncertainty about the sustainability of intervention benefits[7].

The problem is therefore twofold:

1. Lack of comparative intervention trials for PE teachers in special schools.

2. Limited longitudinal evidence on sustained impact after intervention withdrawal.

Research gaps

Although research on teacher burnout has grown significantly in recent years, several critical gaps remain unresolved, particularly in the context of physical education (PE) teachers working in special schools. First, there is a clear population gap. Much of the existing research on teacher burnout has focused on classroom teachers, leaving special school PE teachers underrepresented despite their unique challenges. These teachers are tasked with adapting physical activities for students with disabilities, maintaining safety in demanding environments, and managing both instructional and supervisory duties, which magnify the risk of burnout[4].

A second gap is contextual. Evidence from China demonstrates regional disparities in the causes of teacher burnout, reflecting differences in resources, policies, and school conditions across provinces. However, little is known about the effectiveness of interventions specifically tailored to these diverse contexts. Without such insights, it remains challenging to design evidence-based programs that effectively address burnout in special education settings[4].

The design gap presents another limitation. While intervention studies exist, few have adopted rigorous randomised controlled trial (RCT) designs that compare multiple structured interventions across different time points. This limitation prevents scholars and policymakers from drawing strong causal conclusions about what works best in reducing burnout and whether these effects are sustainable beyond the intervention period[2].

There is also an instrument gap. A variety of instruments have been used to measure burnout, ranging from the Oldenburg Burnout Inventory (OLBI) to the Burnout Assessment Tool (BAT). Yet, in the Chinese educational context, the Maslach Burnout Inventory–Educators Survey (MBI-ES) remains the most widely validated instrument, with strong internal consistency across its three domains: emotional exhaustion, depersonalization, and reduced personal accomplishment (Cronbach's α = .82–.89)[8]. Ensuring comparability and reliability requires further emphasis on consistent use of validated measures such as the Chinese MBI-ES.

Ultimately, a theory gap remains. Many Chinese studies have relied on single frameworks to explain teacher burnout, often neglecting the complex interplay of personal, organisational, and social factors. To capture these dynamics more holistically, the integration of the Job Demands–Resources (JD-R) model, Self-Efficacy Theory, and Social Support Theory is essential. Such a multi-theoretical approach enables an examination of how job demands and resources interact, how teachers' self-efficacy influences resilience, and how social support serves as a protective buffer against stress.

Theoretical framework

This study draws upon three interrelated theoretical frameworks to understand and address burnout among PE teachers in special schools. The Job Demands–Resources (JD-R) model offers a comprehensive occupational framework, positing that burnout arises when job demands, such as workload and stress, exceed available job resources, including collegial support, autonomy, and professional development. By applying this model, it becomes possible to identify which demands are most taxing for PE teachers in special schools and how resources, such as training or mentorship, can alleviate these pressures[4].

Self-Efficacy Theory (Bandura) highlights the importance of teachers' confidence in their professional abilities. Teachers with higher instructional efficacy and adaptive competence are more likely to manage stress effectively and less likely to succumb to burnout. In special education settings, where demands are particularly complex, self-efficacy is a critical protective factor.

Finally, Social Support Theory emphasises the role of emotional, instrumental, and informational support in enhancing teacher well-being. Strong networks of colleagues, administrators, and families reduce stress, foster resilience, and indirectly prevent burnout. This is especially relevant in collectivist contexts, such as China, where a cultural emphasis on interpersonal harmony may amplify the protective effects of social support[2].

Previous research

Several strands of research highlight the relevance of these frameworks. In China, studies on special schools have shown that role conflict, low job satisfaction, and insufficient support are among the primary predictors of burnout among PE teachers[4]. More broadly, research on general teacher burnout demonstrates that heavy workload, high stress, and limited organizational resources drive emotional exhaustion, whereas resilience and teaching efficacy act as buffers[2].

Studies on PE teacher attrition reinforce these findings, with many teachers leaving the profession due to low salaries, poor working conditions, and the cumulative frustrations associated with chronic burnout[3]. These issues underscore the need for structural and policy-level changes, in addition to personal coping interventions.

Intervention studies provide encouraging evidence. For example, yoga- and mindfulness-based programs have shown significant reductions in emotional exhaustion and improvements in psychological well-being among teachers[5]. Similarly, job-crafting and resilience training interventions have been found to enhance self-efficacy and reduce depersonalization, thereby mitigating burnout symptoms[6]. However, the relative effectiveness of these approaches has not been systematically compared in special school settings.

Study aim

To compare the effectiveness of three structured interventions—Mindfulness-Based Stress Reduction for Educators (MBSR-E), Job Crafting with Peer Support Communities of Practice (JC+CoP), and Adaptive-PE Professional Competence Boost (APC-Boost)—in reducing burnout among PE teachers in Fujian special schools.

Research objectives (ROs)

1. To evaluate changes in burnout levels (EE, DP, PA) across four timepoints (W1, W4, W8, W12).

2. To compare the relative effectiveness of MBSR-E, JC+CoP, and APC-Boost.

3. To assess whether reductions in burnout are sustained at follow-up (W12).

4. To provide evidence-based, context-specific recommendations for interventions in Chinese special schools.

Materials and methods

Research design

This study adopted a three-arm randomised controlled trial (RCT) with repeated measures to evaluate the effectiveness of interventions in reducing burnout among PE teachers in Fujian special schools. The interventions lasted eight weeks, and assessments were conducted at four points: baseline (Week 1, T0), mid-intervention (Week 4, T1), post-intervention (Week 8, T2), and follow-up (Week 12, T3). Longitudinal designs are increasingly recommended in burnout research to assess both immediate and sustained effects [1,7].

Participants

Participants were full-time PE teachers recruited from Fujian special schools. Eligibility required (i) at least six months of teaching experience, (ii) active involvement in PE instruction, (iii) intention to remain in post for at least three months, and (iv) literacy in Chinese. Teachers recently commencing psychotherapy were excluded. Sample size estimation targeted a small-to-medium Group × Time effect ($f = 0.20$, $\alpha = 0.05$, $1 - \beta = 0.80$). Allowing for attrition, the final sample size was set at 180 teachers (60 per group). PE teachers are recognised as a high-risk group for burnout due to workload and supervisory demands that often exceed those of classroom teachers[6].

Interventions

1. Mindfulness-Based Stress Reduction for Educators (MBSR-E)

Eight 90-minute sessions on meditation, breathing practices, and stress regulation, supported by daily home practice. Mindfulness-based and yoga-inspired programs have shown effectiveness in reducing teacher burnout symptoms[5].

2. Job Crafting and Peer Support (JC+CoP)

Eight 75-minute sessions combining task/job crafting with peer-based communities of practice. Collegial networks and social support are established protective factors against depersonalization and emotional exhaustion[6].

3. Adaptive-PE Professional Competence Boost (APC-Boost)

Eight 60-minute workshops on adaptive PE instruction, safety management, and inclusive practices, supported by micro-teaching and feedback. Professional competence and career resilience have been shown to buffer against burnout and sustain teacher engagement[7,8].

Table 5 summarises the eight-week intervention framework, illustrating the sequential implementation of the three distinct programs.

Table 5. Eight-Week Intervention Schedule for MBSR-E, JC+CoP, and APC-Boost

Week	MBSR-E (90 min)	JC+CoP (75 min)	APC-Boost (60 min)
1	Introduction to mindfulness; body scan practice; daily home meditation (10 min)	Introduction to job crafting; identifying job demands and resources; forming peer support groups	Workshop on adaptive PE fundamentals; introduction to inclusive teaching strategies
2	Breathing practices for stress regulation: mindful awareness in teaching contexts	Task crafting: redesigning teaching activities to align with strengths	Instructional strategies for diverse learners: adapting physical activities
3	Mindful movement (gentle yoga); cultivating non-judgmental awareness	Relational crafting: building supportive interactions with colleagues and students	Classroom and behaviour management in special PE settings

4	Developing self-compassion practices, dealing with negative emotions	Cognitive crafting: reframing challenges and stressors	Safety management in adaptive PE environments
5	Mindfulness in daily teaching: "breathing space" technique	Peer support CoP session: collaborative problem-solving on teaching challenges	Designing individualised physical education plans for students with disabilities
6	Cultivating present-moment focus; mindful listening	Job crafting review and peer mentoring; exchanging coping strategies	Inclusive assessment methods; monitoring student progress
7	Stress regulation in challenging interactions: mindful resilience	Consolidation of CoP: developing collective action strategies	Micro-teaching practice; peer and facilitator feedback
8	Integration of mindfulness into professional routines; sustaining daily practice	Final CoP session: reflecting on changes; planning sustained peer support	Capstone workshop: reflective practice and career resilience planning

Intervention reliability and validity

To ensure intervention reliability:

1. Manualisation

Each program was delivered according to a standardised intervention manual, ensuring consistency of delivery across schools and facilitators.

2. Facilitator Training

Intervention facilitators underwent a structured two-day training program to standardise delivery methods, consistent with recommendations that well-prepared staff enhance program fidelity.

3. Fidelity checks

Ten per cent of sessions were independently observed using structured checklists; inter-rater reliability was targeted at $\kappa \geq 0.80$ to ensure consistency across evaluators.

4. Adherence Logs

Teachers maintained weekly practice logs to document engagement and compliance, reinforcing reliability through participant accountability.

To establish intervention validity:

1. Content validity

Intervention design was grounded in empirical evidence. Mindfulness and yoga-based approaches have been shown to significantly reduce teacher burnout[5]. Social support and job crafting are validated as protective factors against depersonalization and occupational stress[6]. Professional competence and resilience training improve teacher engagement and buffer against emotional exhaustion[8,7].

2. Construct validity

Each intervention was aligned with mechanisms consistently identified as predictors of burnout stress regulation, collegial support, and professional self-efficacy.

3. Ecological validity

Programs were implemented after regular teaching hours within authentic school environments, reflecting calls for interventions that are contextually relevant and culturally sensitive to teachers' working conditions[9].

Measures

The primary outcome was burnout, assessed using the Maslach Burnout Inventory—Educators Survey (MBI-ES, Chinese version). This instrument measures three subscales: Emotional Exhaustion (EE), Depersonalization (DP), and Personal Accomplishment (PA). It remains the most widely used and validated tool for assessing burnout among teachers in China, with extensive application across educational levels.

Evidence from recent Chinese samples demonstrates strong psychometric properties. Internal consistency has been reported as high, with Cronbach's α values ranging from 0.82 to 0.89 for EE, 0.74 to 0.81

for DP, and 0.76 to 0.85 for PA[8,10]. Confirmatory factor analyses consistently support the three-factor structure (EE, DP, PA), indicating factorial validity in Chinese teacher populations.

Criterion-related validity has also been established. Studies show that MBI-ES scores correlate positively with occupational stress and negatively with teacher efficacy and job satisfaction, supporting its construct validity[6,7]. Furthermore, its convergent validity is confirmed by associations between higher burnout scores and adverse health outcomes such as fatigue and psychological distress[11].

The MBI-ES was administered at four time points: W1 (T0, baseline), W4 (T1, mid-intervention), W8 (T2, post-intervention), and W12 (T3, follow-up). Average completion time was 10–15 minutes.

Pilot testing

Before the main trial, a pilot test was conducted with a small group of twelve PE teachers from two special schools in Fujian to evaluate the feasibility, clarity, and acceptability of the interventions and measurement tools. The pilot confirmed that the MBI-ES (Chinese version) could be completed within fifteen minutes without comprehension difficulties, aligning with previous reports of its practicality and reliability in Chinese educational settings[9,10].

Intervention sessions were trialled in shortened formats to test delivery logistics, timing, and participant engagement. Feedback from participants indicated that mindfulness-based exercises were feasible in after-school schedules, job-crafting discussions were contextually relevant, and adaptive teaching workshops resonated with the practical demands of inclusive PE.

The pilot also provided evidence of ecological validity by demonstrating that interventions could be integrated into the school environment without disrupting teaching schedules, consistent with recommendations that burnout programs should be context-specific and culturally adapted[1,7]. Fidelity checklists were tested, and inter-rater agreement exceeded $\kappa = 0.80$, indicating strong reliability in observational assessments. Based on pilot feedback, minor adjustments were made to session length and the sequencing of activities to optimise flow and participant engagement. These refinements strengthened both the reliability and validity of the intervention protocols prior to the commencement of the full-scale RCT.

Procedures

At baseline (Week 1), participants provided consent and completed the demographics and the MBI-ES. They were then randomised by school into one of three groups (1:1:1). Follow-up assessments at W4, W8, and W12 replicated the baseline measurement protocol. Data were collected by research assistants who were blinded to group allocation to minimise bias.

Data analysis

Data were analysed using an intention-to-treat approach. Linear mixed-effects models with Group, Time, and Group × Time as fixed factors, and participants as random intercepts, were employed. Baseline scores were entered as covariates. Pairwise comparisons at W8 and W12 were adjusted using the Holm–Bonferroni method. Effect sizes (Cohen's d) were reported with 95% confidence intervals. Missing data were addressed with full information maximum likelihood estimation, and multiple imputation was performed as a sensitivity check.

Ethical considerations

Ethical approval was obtained from the Fujian Provincial Education Research Ethics Committee. All participants provided informed consent. Confidentiality was preserved by anonymising data and storing it on secure institutional servers.

Findings

Descriptive results

At baseline (W1), teachers across the three intervention groups reported similar burnout profiles, characterised by moderate-to-high EE and DP, and relatively modest PA scores. Progressive reductions in EE and DP, accompanied by increases in PA, were observed throughout the intervention period, with

the largest changes occurring by post-test (W8). Table 6 presents the descriptive statistics for EE, DP, and PA across the four measurement points.

Table 6. Mean (SD) Scores of Burnout Dimensions Across Groups and Timepoints

Group	Time	EE (↓ better)	DP (↓ better)	PA (↑ better)
MBSR-E	W1	32.1 (6.4)	14.2 (3.5)	21.8 (5.0)
	W4	27.9 (6.0)	12.0 (3.1)	24.3 (4.8)
	W8	22.5 (5.7)	9.4 (2.8)	28.1 (4.5)
	W12	23.6 (5.9)	9.8 (2.9)	27.5 (4.7)
JC+CoP	W1	31.7 (6.2)	14.6 (3.4)	22.2 (4.9)
	W4	28.4 (6.1)	12.3 (3.2)	24.1 (4.7)
	W8	24.1 (5.8)	10.1 (2.9)	27.3 (4.6)
	W12	25.0 (5.9)	10.5 (3.0)	26.9 (4.7)
APC-Boost	W1	31.9 (6.3)	14.4 (3.5)	22.0 (4.8)
	W4	29.8 (6.2)	13.4 (3.3)	23.5 (4.6)
	W8	27.0 (6.1)	11.7 (3.1)	25.6 (4.5)
	W12	27.5 (6.0)	12.0 (3.2)	25.2 (4.6)

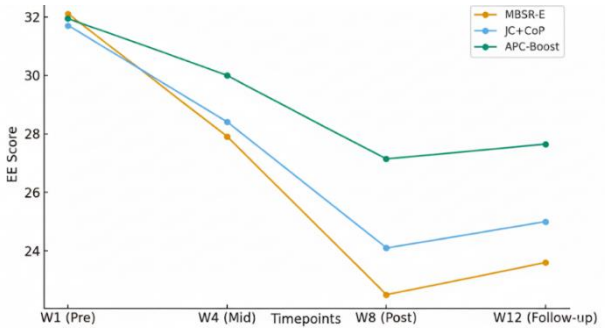
Inferential results

A mixed-effects ANOVA revealed significant Group × Time interactions across all three dimensions: EE ($F(6, 534) = 18.47$, $p < .001$), DP ($F(6, 534) = 16.29$, $p < .001$), and PA ($F(6, 534) = 14.12$, $p < .001$).

Emotional Exhaustion (EE)

Both MBSR-E and JC+CoP produced large reductions from baseline to W8 (–9.6 and –7.6 points, respectively), while APC-Boost showed a smaller decline (–4.9 points). At follow-up (W12), improvements were sustained for MBSR-E and JC+CoP, with APC-Boost showing partial regression.

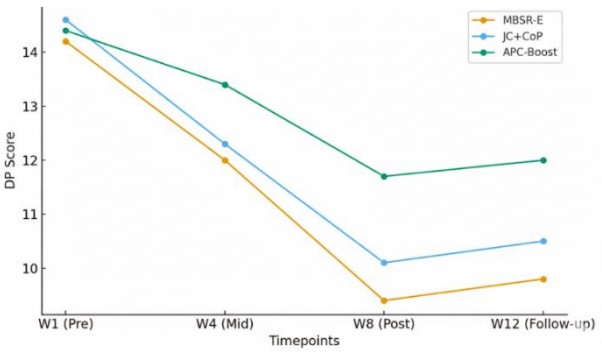
Figure 1. Trends in Emotional Exhaustion (EE) Across Interventions



Depersonalization (DP)

MBSR-E and JC+CoP again outperformed APC-Boost, with reductions of –4.8 and –4.5 points, respectively. APC-Boost recorded a modest decrease (–2.7 points).

Figure 2. Trends in Depersonalization (DP) Across Interventions



Personal Accomplishment (PA)

All three interventions improved PA, though the gains were most pronounced in MBSR-E (+6.3 points) and JC+CoP (+5.1 points). APC-Boost showed moderate improvement (+3.6 points).

Figure 3. Trends in Personal Accomplishment (PA) Across Interventions

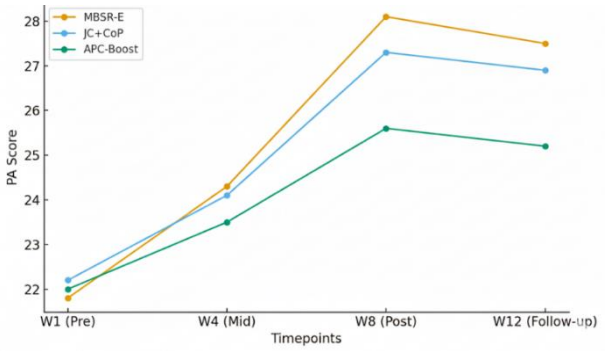


Table 7 presents the effect sizes (Cohen's d) for changes in Emotional Exhaustion (EE), Depersonalization (DP), and Personal Accomplishment (PA) between baseline (W1) and post-intervention (W8) across the three intervention groups. Effect sizes offer a standardised measure of the magnitude of change, enabling meaningful comparisons between interventions beyond raw score differences.

Table 7. Effect Sizes (Cohen's d) for Burnout Changes (W1–W8)

Group	EE (↓)	DP (↓)	PA (↑)
MBSR-E	−1.6	−1.4	+1.2
JC+CoP	−1.3	−1.2	+1.1
APC-Boost	−0.7	−0.8	+0.8

For Emotional Exhaustion (EE), both the Mindfulness-Based Stress Reduction for Educators (MBSR-E, d = −1.6) and Job Crafting with Peer Support Communities of Practice (JC+CoP, d = −1.3) achieved very large effect sizes, reflecting substantial reductions in fatigue and psychological depletion. By contrast, the Adaptive-PE Professional Competence Boost (APC-Boost) program produced a moderate effect (d = −0.7). This pattern indicates that interventions focusing on stress regulation and social support were more powerful in directly alleviating emotional exhaustion than those targeting professional competence alone.

The results for Depersonalization (DP) followed a similar trend. MBSR-E (d = −1.4) and JC+CoP (d = −1.2) both demonstrated large effects in reducing feelings of cynicism and detachment from students, whereas APC-Boost showed a smaller, though still meaningful, effect (d = −0.8). These findings suggest that interventions fostering mindfulness or peer collaboration are more effective in addressing the relational and affective aspects of teacher burnout than skill-based professional development initiatives.

In contrast, Personal Accomplishment (PA) improved across all three interventions, though the gains varied in magnitude. MBSR-E (d = +1.2) and JC+CoP (d = +1.1) recorded large positive effects, indicating notable increases in teachers' sense of competence, self-efficacy, and professional fulfilment. APC-Boost yielded a moderate improvement (d = +0.8), which, while less pronounced, still suggests that skill-based competence training can meaningfully reinforce teachers' feelings of accomplishment.

Overall, Table 2 highlights that while all interventions contributed to reducing burnout symptoms, MBSR-E and JC+CoP were the most effective, particularly in addressing the emotional (EE) and relational (DP) dimensions of burnout. APC-Boost, although less effective in reducing negative symptoms, demonstrated consistent benefits in enhancing PA, aligning with its focus on competence and professional

skill development. These findings highlight the complementary nature of the interventions: stress-regulation and peer-support strategies may be more effective in alleviating immediate emotional strain, whereas competence-based training provides a foundation for sustained professional confidence.

The results clearly indicate that MBSR-E and JC+CoP are the most effective and sustainable interventions for reducing emotional exhaustion and depersonalization while enhancing personal accomplishment. In contrast, APC-Boost demonstrated moderate effects, primarily improving professional accomplishment but exerting a weaker influence on the emotional dimensions of burnout. These findings highlight the need for hybrid interventions that combine mindfulness and peer-support strategies with professional competence development to comprehensively reduce burnout among PE teachers in special schools.

Discussion

RO1: To evaluate changes in burnout levels among PE teachers following participation in each intervention

All three interventions yielded reductions in Emotional Exhaustion (EE) and Depersonalization (DP), alongside increases in Personal Accomplishment (PA). However, the scale and nature of these improvements varied considerably. MBSR-E produced the most substantial reductions in EE, with an average decline of 9.6 points, suggesting that mindfulness-based stress regulation directly alleviates the fatigue and depletion central to burnout. These results align with prior research, demonstrating that mindfulness and yoga-based interventions can significantly reduce teacher stress and exhaustion while enhancing overall well-being[5]. JC+CoP was similarly effective in reducing EE (–7.6 points) and DP (–4.5 points), reflecting the buffering role of peer networks and job redesign in providing psychological and social resources. This finding aligns with Sang et al.[4], who identified insufficient collegial support and role conflict as major predictors of burnout among Chinese special school PE teachers.

By contrast, APC-Boost achieved smaller reductions in EE (–4.9 points) and DP (–2.7 points), but its most notable impact was on PA (+3.6 points). This is consistent with the intervention's focus on enhancing adaptive competence and self-efficacy. Previous studies have highlighted professional competence as a protective factor against burnout, particularly in special education contexts where teachers face complex instructional demands[6,15]. Thus, APC-Boost was valuable in strengthening teachers' confidence and professional identity, even if it was less effective in reducing emotional strain.

RO2: To compare the relative effectiveness of MBSR-E, JC+CoP, and APC-Boost

The comparative results demonstrated that MBSR-E and JC+CoP outperformed APC-Boost in addressing EE and DP, the emotional and relational core of burnout. Both interventions provided critical resources that buffered high job demands: mindfulness skills in MBSR-E and collegial support in JC+CoP. These findings strongly support the Job Demands–Resources (JD-R) model, which posits that resources, whether psychological or social, can offset the negative impact of excessive demands[4].

Evidence from other educational contexts mirrors these results. Mindfulness-based training has been consistently linked with reduced anxiety, improved stress management, and enhanced teaching efficacy[13,14]. Similarly, teachers engaged in structured peer support networks report significantly higher well-being and lower burnout[16,17]. Although APC-Boost was less effective in reducing EE and DP, its improvements in PA should not be underestimated. Professional accomplishment is a vital resource for sustaining motivation and reducing long-term attrition.

RO3: To examine whether reductions in burnout are sustained at follow-up (W12)

A critical objective of this study was to determine whether intervention effects persisted beyond program completion. At W12, both MBSR-E and JC+CoP sustained significant improvements in EE and DP, while APC-Boost showed partial regression. These findings suggest that resource-based interventions (psychological and social) foster more durable effects than competence-based training alone. This aligns with Agyapong et al.[2], who emphasised that resilience-building and support-based interventions yield longer-lasting impacts on burnout compared to one-off training programs. In Chinese special schools, where PE teachers face ongoing demands such as diverse student needs and administrative pressure,

interventions that cultivate enduring coping skills and social bonds appear more effective in sustaining well-being[4].

RO4: To provide evidence-based recommendations for scalable, context-sensitive interventions

The final objective was to generate actionable recommendations. Based on the findings, MBSR-E and JC+CoP represent the most effective and sustainable interventions for mitigating burnout in Fujian special school PE teachers. MBSR-E directly addressed emotional exhaustion through mindfulness practices, while JC+CoP reduced depersonalization by fostering social connectedness and peer support. APC-Boost, though less impactful on EE and DP, enhanced professional accomplishment by improving adaptive competence.

These findings support the argument for hybrid intervention models that combine mindfulness training, peer support networks, and competence development. Such integrative approaches would address all three dimensions of burnout simultaneously. Similar recommendations have been advanced in the literature, where resilience training, social support systems, and competence enhancement are identified as complementary strategies for reducing burnout[7,8,18].

From a policy standpoint, embedding these interventions into ongoing professional development and aligning them with national priorities, such as the 14th Five-Year Plan for Special Education (2021), would institutionalise support for teacher well-being. Such integration could also address systemic barriers, heavy workloads, low social status, and limited infrastructure that exacerbate burnout in Chinese special schools[3,9].

Background Comparison between the two (international)

The international research revealed that both in the United States (Sang et al., 2022) and the United Kingdom (Cheng, 2023), some of the most common stressors that cause burnout among physical education (PE) teachers are role ambiguity, workload, and the absence of institutional support. Such stressors are further increased in special education where educators have to cope with different needs of students and have to take care of the strict academic and extracurricular demands at the same time. As an illustration, a research in the UK found out that PE teachers in special education environments have a higher degree of emotional burnout and depersonalization than their colleagues in mainstream education (Cheng, 2023). Equally, studies on the topic in the United States showed that a considerable proportion of PE educators feel burned out because of excessive job expectations and the lack of professional support (Sang et al., 2022). These cross-national results highlight the universalism of burnout in PE teachers and support the usefulness of the interventions that are experimented in this study and are aimed to eliminate major sources of stress in various educational settings.

Integration with theoretical frameworks

The results can be understood through a multi-theoretical lens combining the JD-R model, Self-Efficacy Theory, and Social Support Theory.

JD-R model

MBSR-E and JC+CoP both provided critical resources that buffered against high job demands. Their sustained effects reinforce the JD-R premise that sufficient resources not only reduce strain but also promote engagement[4]. APC-Boost, by contrast, offered skill-based resources but did not directly alleviate emotional demands, explaining its weaker performance on EE and DP.

Self-efficacy theory

Improvements in PA across all interventions reflect enhanced professional efficacy. Teachers who feel competent are more resilient against stress and less prone to burnout. APC-Boost's competence focus aligns with this theory, as higher self-efficacy directly contributes to reduced emotional exhaustion and enhanced job satisfaction[15].

Social support theory

The JC+CoP intervention highlighted the role of social networks. Structured peer collaboration significantly reduced DP and sustained improvements at W12, consistent with evidence that collegial and institutional support protect against stress in collectivist cultures[2].

Comparison with previous research

These findings are consistent with international research on teacher burnout. Global prevalence rates indicate that between 25% and 74% of teachers experience moderate to severe burnout[2]. PE teachers are disproportionately affected due to their dual instructional and supervisory roles, compounded by extracurricular and administrative responsibilities[6]. In special schools, additional stressors such as managing diverse disabilities, limited resources, and low social recognition exacerbate vulnerability[4].

The effectiveness of mindfulness-based interventions in this study mirrors evidence from global trials. Lensen et al.[13] and Juul et al.[14] confirmed that MBSR reduces teacher stress, anxiety, and exhaustion. Likewise, peer-support programs such as CoPs have been widely recognised for fostering resilience and collective efficacy in educational contexts[16,17].

APC-Boost's emphasis on competence development resonates with the literature, which emphasises the role of teacher self-efficacy in preventing burnout. For instance, Cho et al. [15] demonstrated that adaptive competence training improved teacher resilience in inclusive classrooms, while Kitikar et al. (2025) [18] highlighted the importance of professional flexibility in reducing occupational stress.

Practical and policy implications

The evidence suggests several practical and policy directions:

1. Hybrid intervention models that integrate mindfulness, peer support, and competence-building should be prioritised. Such models can target all three dimensions of burnout simultaneously.

2. Institutional support is critical. Sustained improvements depend on organisational commitment to embedding these programs into teacher development and school culture.

3. Cultural sensitivity matters. In collectivist contexts like China, interventions that emphasise peer relationships and group harmony, such as JC+CoP, may be particularly impactful.

4. Competence gaps must be addressed. Continuous professional development in adaptive PE remains essential for building self-efficacy and long-term resilience.

Cases to Enhance Intervention Design

It is suggested to add more interactive group activities in the Mindfulness-Based Stress Reduction for Educators (MBSR-E) intervention and offer a continuous support after the intervention. This would boost the social and emotional support aspects of mindfulness practices, which would boost long-term engagement and retention. Group discussions and peer mentoring may prove useful in maintaining mindfulness habits following the end of intervention time such as high-stress teaching events such as the start of the school year or during exam preparation. These supplements would cover the gap in the continued support observed in earlier literature which demonstrated that mindfulness interventions most effectively affect the continued practice when teachers are continually encouraged and supported (Juul et al., 2021).

In the same way, in the case of the Job Crafting with Peer Support Communities of Practice (JC+CoP) intervention, it would be helpful to incorporate more systematic chances of the peer feedback and job crafting workshops during a year. This would enhance the feeling of community and further professional growth in the teachers and would make the gains of the peer support network remain even after the period of intervention. Moreover, more frequent meetings may offer teachers more chances to exchange the ideas on how to cope with workload and stress, which will further reduce burnout (Latino et al., 2021).

Lastly, in the Adaptive-PE Professional Competence Boost (APC-Boost), there could be more integrated teaching simulations and micro-teaching sessions during which the teachers will be able to apply the adaptive PE techniques to the safety and supportive environment and only after that, impose them on the students. Such activities would enable teachers to feel more confident and capable of handling the

special needs of students with disabilities and address the emotional exhaustion and depersonalization that most PE teachers in the special education environments undergo (Sang et al., 2022).

Limitations and future directions

While the randomised controlled design enhances causal inference, several limitations should be acknowledged. The sample was limited to Fujian Province, which restricts generalizability across China. Data were collected via self-report, which may be subject to social desirability bias, although the MBI-ES has demonstrated strong reliability in Chinese samples (Cronbach's α = .82–.89) [11]. The follow-up period (four weeks post-intervention) was relatively short; longer-term assessments are needed. Future research should employ multi-site longitudinal designs, incorporate objective stress measures (e.g., cortisol, heart rate variability), and test hybrid interventions that combine mindfulness, peer support, and competence training. Further validation of alternative instruments such as the Burnout Assessment Tool (BAT-23, Chinese version) and the Oldenburg Burnout Inventory (OLBI-C) could strengthen measurement accuracy [19,20].

Moreover, this study has the restriction of a comparatively brief follow-up (W12). Future research needs to use longer follow-up periods to determine the long-term outcome of burnout interventions. Also, the results of the study might not be applicable to the whole range of countries because of regional differences in the workload of teachers and their support. The research was based in Fujian, China where education situation, teacher role and institutional support mechanisms might be very different than in other nations. Also, even though the research uses a substantial number of PE teachers working in special schools, it might be that the results obtained might not be entirely representative of the experiences of PE teachers in mainstream schools and others in different areas with different education systems. Research in the future ought to investigate these differences and use a more heterogeneous sample to determine the generality of the intervention models.

Conclusion

MBSR-E and JC+CoP achieved the most substantial and sustainable reductions in Emotional Exhaustion and Depersonalization, underscoring the importance of mindfulness practices and collegial support in addressing the emotional and relational core of burnout. APC-Boost, while less effective in alleviating these domains, significantly enhanced Personal Accomplishment, reflecting the role of professional competence and self-efficacy in strengthening resilience and motivation. Taken together, these results suggest that hybrid approaches integrating mindfulness, peer collaboration, and adaptive competence development may provide the most comprehensive and durable benefits for teacher well-being.

The findings also reinforce theoretical propositions from the Job Demands–Resources model, Self-Efficacy Theory, and Social Support Theory. By buffering high job demands through personal and social resources, and by enhancing professional efficacy, these frameworks collectively explain the differential impacts of the interventions. Moreover, the cultural context of Chinese special schools where collectivist values and institutional pressures intersect highlights the need for context-sensitive programs tailored to teachers' unique demands.

From a practical standpoint, embedding such interventions into professional development frameworks and aligning them with national educational reforms could support teacher retention, reduce attrition, and improve the overall quality of special education. Institutional support, policy alignment, and long-term monitoring will be essential for sustaining intervention gains.

While the study contributes novel evidence to the literature, limitations should be acknowledged, including its single-province sample, reliance on self-reported measures, and relatively short follow-up. Future research should extend to multi-site longitudinal studies, incorporate physiological indicators of stress, and evaluate hybrid intervention models for scalability and cultural adaptability.

In conclusion, this study demonstrates that structured, evidence-based interventions can meaningfully reduce burnout among PE teachers in special schools. By prioritising psychological resilience, social support, and professional competence, educational institutions and policymakers can better safeguard teacher well-being, enhance professional longevity, and ultimately improve outcomes for students with special educational needs.

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