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Exploring interventions for fostering resilience among medical educators

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ABSTRACT

Introduction: Resilience is essential for medical educators to fulfil their responsibilities. While research often focuses on individual well-being programs, less is known about how resilience is shaped by systemic and institutional interventions, particularly across diverse cultural contexts. This study explores interventions perceived by Hong Kong (HK) medical educators as fostering their resilience.

Methods: Participants were purposively sampled across socio-demographic characteristics collected *via* an online survey. Twenty medical educators from two HK medical schools participated in video-recorded, semi-structured online interviews. Transcripts were anonymized and an abductive reflective thematic analysis was conducted. Researchers iteratively engaged with Bronfenbrenner's Process-Person-Context-Time (PPCT) model to deepen interpretation.

Results: Nine interrelated themes were identified across four PPCT domains. Resilience was shaped by personal reflection and self-care (Person); supportive relationships and communication (Process); institutional conditions (Context); and changes across life stages plus external events (Time). Process- and Context-level interventions were perceived as essential for fostering medical educators' resilience.

Discussion/Conclusion: The findings underscore the importance of designing resilience interventions that address relational, institutional, systemic and cultural dimensions. Key areas include professional recognition, communication, resource allocation, and psychologically safe environments. Understanding culturally- and contextually-specific experiences of resilience may assist in crafting fit-for-purpose resilience interventions for educators in multicultural environments.

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Resilience; medical educators; interventions; well-being; PPCT model

Introduction

Within the sphere of medical education, resilience is an important attribute supporting educators to effectively navigate the myriad challenges inherent in their profession [1–5]. Often defined as the capacity to triumph over adversity, resilience is widely acknowledged in the literature as being multifaceted in nature [6–7]. Beyond its theoretical underpinnings, resilience has been recognized as a factor mitigating burnout and emotional exhaustion, helping to sustain academic productivity and supporting professional fulfilment [2,3,5,8–12]. A recent systematic review delved into interventions (e.g. mindfulness-based, cognitive-behavioral-based, and face-to-face group-based workshops) aimed at enhancing resilience among healthcare professionals,

Practice points

- Resilience intervention research lacks focus on systemic and institutional factors.
- This was the first East Asian study exploring resilience among medical educators.
- It explored Hong Kong medical educators' perspectives on resilience interventions.
- They advocated for interventions across relational, institutional and systemic levels.

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uncovering their effectiveness in alleviating workplace stress and burnout [13]. While the review focused primarily on clinical healthcare workers, the findings are relevant to health professions educators, many of whom also hold dual clinical-academic roles and face overlapping pressures. As such, the generalizability of these interventions to medical educators warrants exploration, particularly in diverse sociocultural and institutional settings where role demands and support structures may differ.

Most existing studies were conducted in Western healthcare systems and higher education environments. These findings, while valuable, may lack generalizability to non-Western contexts, particularly in East Asia, where differing educational practices, hierarchical professional structures, and collectivist cultural values shape both the challenges faced by medical educators and the ways in which resilience is fostered [2,3,5,8–13]. Therefore, the present study specifically focuses on medical educators in Hong Kong (HK), an East Asian setting with unique sociocultural dynamics and institutional demands.

While participant demographics provide some indication of diversity, we contend that "culture" in this study refers not so much to ethnicity or nationality, but more broadly to the attached values, beliefs, norms, and institutional practices that influence educators' professional lives. In the HK context, cultural influences often emphasize relational harmony, respect for hierarchical and generational authority, and a collectivist orientation [14–17]. These values can impact how medical educators perceive and express challenges related to mental health and well-being, which may be discussed less openly due to prevailing norms of emotional restraint and interdependence [17–18].

HK medical educators represent a distinct population within the broader group of healthcare professionals. Unlike clinicians who may focus primarily on patient care, medical educators in HK often juggle clinical duties alongside teaching, research, and administrative responsibilities within a system characterized by high performance expectations and long working hours. While clinicians across regions experience high-pressure environments, the cultural expectations and academic norms in East Asian settings intensify these pressures, making resilience particularly critical yet potentially different in its development and expression [8,9,19,20]. This study aims to address this contextual difference by exploring the perspectives of HK-based medical educators—a group underrepresented in resilience intervention literature.

To frame this inquiry, we draw on Bronfenbrenner's bioecological theory of human development, with particular reference to its most comprehensive formulation: the Process-Person-Context-Time (PPCT) model [21–22]. The PPCT is an evolution of Bronfenbrenner's earlier work, retaining the core ecological premise that individuals develop within nested environmental systems. Bronfenbrenner's original Ecological Systems Theory (EST) was instrumental in shifting attention toward the role of environmental context in shaping human development [23]. His early framework offered a structure for organizing multiple layers of context that influence the individual [23–25]: the *Microsystem* (immediate relationships), *Mesosystem* (interactions between microsystems), *Exosystem* (indirect institutional influences), *Macrosystem* (broader sociocultural values and norms), and *Chronosystem* (the influence of time) [23]. However, the initial ecological framework tended to overemphasize the environment and underplay the reciprocal, developmental processes through which individuals shape and are shaped by their environments. Bronfenbrenner evolved the framework to integrate person and time variables more explicitly, culminating in the PPCT model [21–22]. The PPCT model includes four interrelated components: *Proximal Processes* (the regular, sustained interactions between individuals and their immediate environments), *Person* (individual traits that influence how individuals engage with their environments and interpret and respond to challenges), *Context* (the nested systems detailed in Bronfenbrenner's EST, including the micro-, meso-, exo-, and macro-systems), and *Time* (the temporal dimension encompassing both developmental time, such as changes across one's career, and historical time, such as instutional reforms or the COVID-19 pandemic) [21–23]. By adopting the PPCT model, we can trace how resilience is produced over time, in specific cultural and institutional environments, through the everyday practices and evolving perspectives of individual educators.

Our study therefore sought to explore HK-based medical educators' perceptions of interventions that supported their resilience, with the aim of informing the development of contextually and culturally responsive strategies to sustain their well-being and effectiveness.

Methods

Study design

This study was part of a larger mixed-methods research project investigating resilience within HK medical education. We adopted a qualitative approach to explore the interventions that HK-based medical educators perceived as fostering their resilience. The overarching project of which this study was a part, aimed to examine resilience among medical educators in HK. It used a combination of qualitative interviews, quantitative assessments of resilience, well-being and distress levels, as well as validation of the World Health Organization Well-Being Index (WHO-5) within this

population. Ethical approval was obtained from the institutional review boards of the city's two medical schools and we adhered to the consolidated criteria for reporting qualitative research (COREQ) standards [26] (Supplementary Table 1).

Participants

Medical educators affiliated with the LKS Faculty of Medicine at The University of Hong Kong (HKU) and the School of Public Health and Primary Care at the Chinese University of Hong Kong (CUHK), who were actively engaged in the training of medical learners and/or physicians, were eligible to participate in this study. To ensure a broad range of perspectives, we employed maximum variation sampling. Participants were purposively selected based on diverse sociodemographic characteristics (including gender, age, years of experience, and discipline). Eligible medical educators were invited to participate in online individual semi-structured interviews *via* email.

Data collection

The interview protocol (Supplementary Method) was used by the principal investigator (L.C.) to conduct semi-structured individual interviews in English between summer 2021 and spring 2022, which were audio- and video-recorded over Zoom (Zoom Video Communications, San Jose, California). L.C., a female academic family physician, had research experience and interests that revolved around the resilience of educators within medical education. The recordings lasted approximately 25 min and subsequently, all underwent verbatim transcription, anonymization, and proofreading by our researchers. Participants also completed an anonymous online sociodemographic questionnaire developed using Qualtrics (www.qualtrics.com). While participants who completed interviews were grouped, the sociodemographic responses could not be directly linked to individual interview transcripts. This design allowed us to describe the sample characteristics while preserving participant anonymity. Recruitment of medical educators ceased when the data collected addressed our research question sufficiently.

Data analysis

Our five research team members (L.C., P.C., E.B., Z.T., S.Y.) represented varying cultural and professional backgrounds including biomedical science, clinical medicine, medical education, and psychology. Additionally, our academic researchers were at different stages of their medical educator journeys, from early- through to mid-career. We conducted a reflexive thematic analysis following Braun and Clarke's six-phase methodology: data familiarization; initial coding; searching for themes; reviewing themes; defining and naming themes; and writing up [27]. Each transcript was read twice independently by all team members to ensure immersion and surface initial impressions. Transcripts were divided among team members, with two researchers independently coding each transcript. Following individual transcript coding, we collaboratively developed an initial codebook during structured analysis meetings. This codebook evolved over time as new codes emerged, were merged, or redefined through collective discussion. Throughout this process, interpretive disagreements naturally arose and were resolved through consensus-building in regular meetings. In these meetings, we revisited the transcripts and returned to participants' own words to guide resolution.

Our analytic approach was abductive, involving back-and-forth movement between empirical data and theoretical concepts [28–29]. While coding and theme development were initially inductive, we subsequently engaged with Bronfenbrenner's PPCT model to deepen our interpretation [21–22]. The PPCT framework was used iteratively and reflexively to re-examine the data, refine thematic structures and reveal relational patterns. For example, when educators spoke of the emotional recalibration they experienced through reflection or mentorship, we reinterpreted these not merely as coping strategies, but as proximal processes shaped by individual characteristics. One participant captured this dynamic interplay by reflecting, *'I was not resilient enough … but then I recovered. So the reason I recovered [was] because I understood the situation better … I have someone like a mentor talk to me, and then I realized, "Oh, I should think in another way."'* (Participant 2). This iterative dialogue between data and theory helped us move beyond surface-level descriptions.

The analysis was deeply reflexive: team members discussed how their own roles, assumptions, and cultural lenses might influence interpretation. These discussions were conducted in regular meetings and were used to challenge biases, examine alternative explanations, and ensure conceptual coherence. NVivo 14.23.2 (Lumivero, Denver, Colorado) served as a tool for conducting our qualitative analysis.

Ethics

This study received ethical approval from the University of Hong Kong (ref: EA200136) and Joint Chinese University of Hong Kong-New Territories East Cluster Clinical Research Ethics Committee (ref: 2021.079).

Results

Participants

Twenty medical educators participated and their demographic profile revealed a balanced gender distribution. The participants represented a range of ages: 6 were aged 30–39 years (30%), 6 were 40–49 years old (30%), 5 were 50–59 years old (25%), and 3 were aged 60 or above (15%). No participants were aged 20–29 or selected "prefer not to say". The vast majority ($n = 17$, 85%) identified ethnically as Chinese, were married and engaged in full-time employment. More than half held a doctorate as their highest professional qualification ($n = 11$, 55%) and most had 5–9 years of experience as health professions educators ($n = 6$, 30%). Please see Supplementary Table 2 for more details on participant demographics.

Summary of results

Guided by Bronfenbrenner's PPCT model, the analysis situates resilience development as a dynamic process shaped by the interaction of individual characteristics (**Person**), meaningful relationships and practices (**Process**), broader institutional and cultural environments (**Context**) and change across career stages and life events (**Time**) [21–22]. The findings are organized into nine interrelated themes across four PPCT domains (Figure 1). While each theme highlights a primary domain, many reflect intersections across PPCT elements. Together, they highlight where and how targeted, culturally relevant and system-sensitive interventions can be designed to better support medical educators. Detailed codebooks and exemplar quotations are outlined in Supplementary Tables 3–6.

Person: Internal capacities shaping resilience

Within the **Person** domain of the PPCT model, participants described individual and structured strategies that enabled them to sustain well-being and adapt to challenges. Two themes were identified.

Theme 1: Self-initiated resilience strategies

Two sub-themes were evident. First, sub-theme 1.1. *reflective practice and expectation management* enabled educators to adapt and remain mindful of personal limits: *"I think we all need to be very mindful and we need to recognize what energizes us"* (Participant [P]12) and *"We first need to manage our expectations"* (P5). Second, sub-theme 1.2. *lifestyle and self-care practices* such as exercise, hobbies, rest, and work–life balance replenished energy: *"The first thing I'll say is sleep and rest"* (P18). These practices illustrated resilience as both adaptive and preventive, helping educators to balance personal resources with professional demands. This theme underscores the value of fostering a culture that legitimizes and

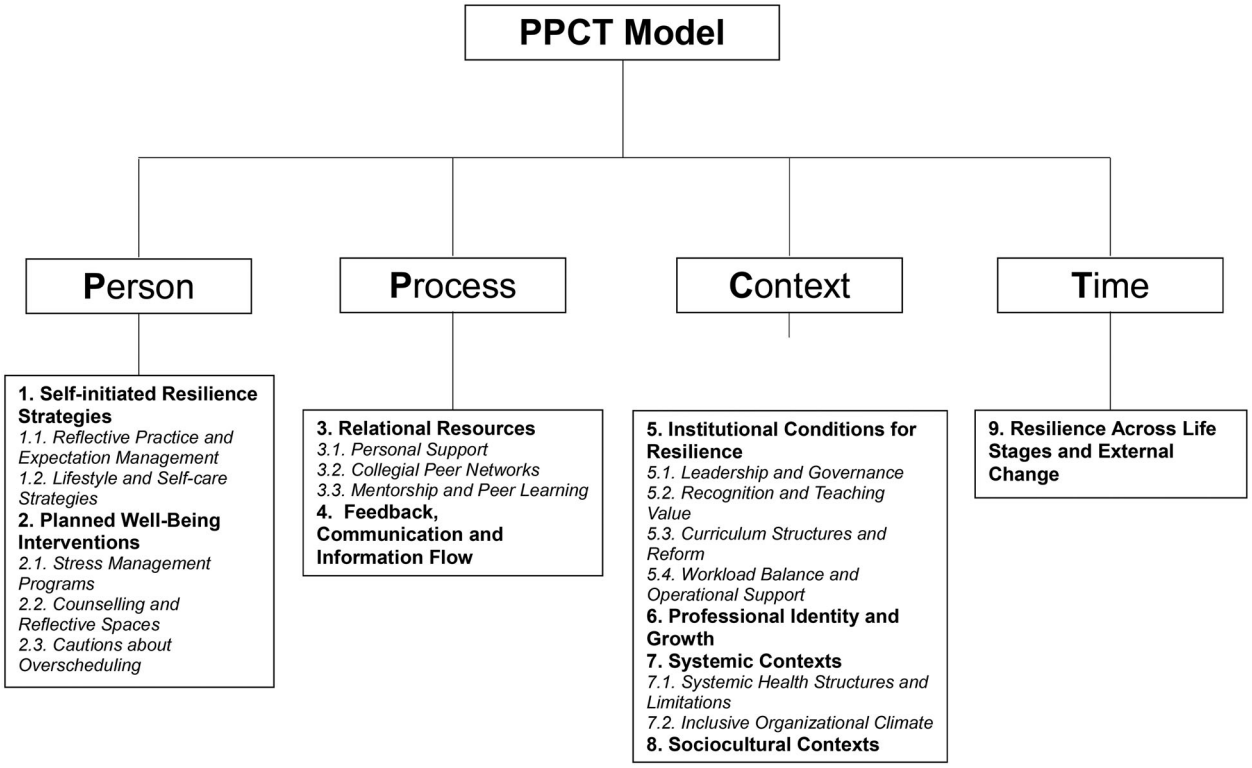

Figure 1. Mapping of interventions fostering medical educators' resilience to the process-person-context-time (PPCT) model.
Description: A conceptual map of the interventions perceived to promote resilience identified by medical educators in our study, mapped to the domains of the PPCT model [22].

enables self-care. Institutions might consider implementing flexible scheduling, which may support **Person**-level coping resources, while embedding them in daily **Processes**.

Theme 2: Planned well-being interventions

In addition to self-directed efforts, participants discussed the value of organized support. First, the sub-theme 2.1. *Stress management programs* were viewed as essential for resilience: '*… stress management is one of the very important things I would like to advocate*' (P10). Others pointed to sub-theme 2.2. *counselling and reflective spaces* as vital outlets to process challenges: '*Counselling sessions … would be very helpful*' (P17). At the same time, some expressed skepticism, reflecting sub-theme 2.3. *cautions against overscheduling* and superficial initiatives: '*I don't know whether organizing more things is useful*' (P18).

Taken together, the **Person** domain highlights resilience as supported by both self-directed strategies and structured interventions, reinforcing the intersection of individual needs and process-based support.

Extended descriptions, sub-themes, and additional quotations for the **Person** domain are provided in Supplementary Table 3.

Process: Relational and developmental interactions

In the **Process** domain, resilience was supported by everyday relational and communicative interactions. These proximal processes often provided emotional grounding, practical guidance, and a sense of belonging. Resilience interventions should seek to strengthen the quality, consistency and emotional safety of everyday relational processes, which function as the core building blocks of resilience in medical education.

Theme 3: Relational resources

Three sub-themes emerged. First, sub-theme 3.1. *Personal support* from family and friends acted as an emotional anchor: '*Having an understanding group of people around you*' (P9). Second, sub-theme 3.2. *Collegial peer networks* provided solidarity at work, though participants noted it required more deliberate effort post-pandemic: '*Corridor consultations … don't happen very often [now] unless we set them up deliberately*' (P1). Finally, sub-theme 3.3. *Mentorship and peer learning* were highly valued for perspective-taking and affirmation: '*So the reason I recovered [was] because I understand the situation better … I have someone like a mentor talk to me, and then I realized, 'Oh, I should think in another way*' (P2). Together, these findings show resilience as co-constructed across personal and professional ecosystems. Interpersonal initiatives can function as structured environments that embed resilience-promoting processes into the daily professional landscape, especially when aligned with career stages (**Time**).

Theme 4: Feedback, communication and information flow

Participants highlighted the role of supportive feedback and transparent communication in sustaining resilience. Student appreciation was described as energizing: "*When you get a positive feedback … the adrenaline has been pumped into your body and you don't feel tired at all*" (P3). Collegial dialogue offered reflection and validation: '*Perhaps we might be venting emotions together but it's sort of like having a mirror*' (P4). Access to timely institutional information reduced uncertainty, though junior staff noted gaps compared to senior colleagues: '*I think information is important to us to reduce our uncertainty, … those [of us] who are older, get more [of these] information in general, because of our position. And then that [helps us to] have high resilience*' (P11).

Overall, the **Process** domain emphasizes the centrality of relationships, feedback, and communication as developmental mechanisms of resilience. Strengthening these everyday interactions offers practical opportunities for intervention.

Detailed sub-themes, additional quotations, and expanded interpretations of the **Process** domain are presented in Supplementary Table 4.

Context: Institutional, cultural and structural systems

The **Context** domain encompasses the layered institutional, cultural and structural environments shaping medical educators' capacity for resilience. This includes the *exosystem* (such as institutional governance, operational support, and recognition systems) and the *macrosystem* (broader cultural values and societal structures). Across Themes 5 to 8, participants described resilience as not only a personal or relational process, but as deeply dependent on systemic conditions such as leadership style, teaching recognition, curriculum design, and workload balance. Supportive governance, fair career pathways, and adequate resources enhanced resilience, while bureaucratic inefficiencies, lack of recognition, and cultural norms discouraging emotional expression undermined it.

Theme 5: Institutional conditions for resilience

Medical educators emphasized that their resilience was strongly contingent on institutional practices. First, sub-theme 5.1. *Leadership and governance* could either foster psychological safety or erode

motivation: '*management and leadership [are] important to help… build better resilience*' (P11). While individual leaders' interpersonal qualities mattered, the greater emphasis was placed on how leadership decisions structured institutional culture, priorities, and working conditions. These top-down influences were seen as indirectly affecting educators' day-to-day experiences, including autonomy, workload, morale, and access to support. Second, sub-theme 5.2. *Recognition and teaching value* mattered deeply, with some noting the invisibility of teaching contributions: '*the people who's really teaching… are constantly overlooked*' (P6). Participants emphasized that resilience is not limitless, but is contextually dependent on sustained institutional affirmation. Intertwined with the PPCT **Person** and **Time** domains, educators' internal coping strategies may weaken over time in environments that lack external validation or fail to reward work they find meaningful.

Sub-theme 5.3. *Curriculum structures and reform* shaped morale, with participants contrasting alienating top-down approaches with inclusive processes: '*the whole medical education world really had to come together and think of new ways of teaching*' (P5). Lack of participatory structures in curriculum planning may erode resilience by reinforcing a sense of disempowerment and leaving educators feeling burdened rather than supported. Finally, sub-theme 5.4. *workload balance and operational support* directly determined sustainability: '*It's important to keep the clinical workload and the teaching workload balanced*' (P13). Participants described the emotional and physical toll of understaffing and inadequate support infrastructure. Educators were expected to maintain high teaching quality in overstretched environments, often teaching hundreds of students: '*In a large cohort we only have three to four teachers teaching like almost 200 students in one go… very exhausting after consecutively teaching for five hours*' (P3). Taken together, Theme 5 shows that resilience is not only an individual trait but a reflection of how well institutional systems enable educators to thrive.

Theme 6: Professional identity and growth

Resilience was also shaped by how institutions supported educators' professional identity, competence, and career development trajectories. Identity and meaning anchored participants' motivation, with some describing teaching as a moral responsibility: '*I belong here and my heart and soul and all these transform to a sort of energy to fuel the resilience*' (P6). Skill development helped buffer stress and uncertainty, particularly in areas such as digital learning: '*to improve resilience… adopt the IT and E-learning techniques*' (P20). Career progression opportunities were equally important, especially for early-career educators; clear pathways were seen as motivating and protective: '*If there's [a] clear established career ladder… it'll improve their resilience by a lot*' (P6). This underscores the relevance of the **Time** domain for career-stage needs, specifically revealing that early-career educators would benefit from clearer career trajectories. Institutions can enhance resilience by investing in structured, stage-sensitive professional development programs. Taken together, Theme 6 highlights professional growth as a contextual resource for resilience. Identity affirmation, ongoing skill development, and structured career trajectories provide educators with the confidence and purpose needed to face evolving demands.

Theme 7: Systemic contexts

Educators highlighted that their resilience was shaped not only by institutional practices but also by broader systemic and cultural forces at the *exosystem* and *macrosystem* levels of the PPCT model. First, sub-theme 7.1. *Systemic health structures and limitations* were described as persistent stressors, with strained healthcare systems mirrored in overstretched academic workloads: '*We're asked to do quite a lot as academics… we're already sort of stretched, um, just like our health system*' (P18). Participants also expressed frustration with bureaucracy and resource allocation: '*Go away with the bureaucracy and try to get the job done*' (P13). Some advocated for social–medical integration, seeing structural reform as essential to sustaining both healthcare and education. Second, sub-theme 7.2. *Inclusive organizational climate* was identified as another resilience-enabling factor. Educators noted that equity, diversity, and inclusion fostered openness and collective strength: '*We want to be called [for] the climate or ethos of the institution*' (P13). Conversely, cultural silence around identity or emotional well-being was seen as limiting, with calls for cultural environments that are '*more open*' (P16). Together, these findings underscore that resilience is not only individually or institutionally determined, but also reliant on systemic investment and inclusive cultural ethos to enable educators to thrive.

Theme 8: Sociocultural contexts

Resilience was also shaped by macrosystemic sociocultural norms and societal conditions. Participants noted that East Asian expectations around restraint and emotional control often discouraged open discussion of stress or distress: '*We do not talk about our psychosocial well-being very fluently*' (P16). Such norms, while fostering professionalism, could limit help-seeking and undermine resilience. Some cautioned against importing Western resilience practices without adaptation: '*What works may not be*

necessarily working in this particular cultural context' (P17). In addition, broader societal and environmental stressors in Hong Kong were described as compounding pressures: '*Living in Hong Kong is actually quite stressful*' (P10). Collectively, these reflections highlight the significance of culturally grounded and socially sensitive approaches to supporting resilience.

The **Context domain** demonstrates that resilience is deeply shaped by the systems and cultures in which medical educators are embedded. Institutional conditions (Theme 5), opportunities for identity formation and growth (Theme 6), systemic structures and inclusive climates (Theme 7), and sociocultural norms (Theme 8) interact to either enable or constrain educators' abilities to adapt. These findings emphasize that resilience cannot be understood or strengthened through individual-level interventions alone; it requires systemic alignment, cultural attunement, and organizational investment to create environments where educators can both persist and thrive.

Expanded sub-themes, extended participant quotations, and further analyses for the **Context** domain are presented in Supplementary Table 5.

Time: Lifespan and environmental transitions

The **Time** domain highlights how resilience develops across career stages and adapts to wider environmental shifts. Participants reflected that both accumulated life experience and sudden external disruptions influenced their coping capacity and resource needs.

Theme 9: Resilience across life stages and external change

Medical educators described how external shocks, such as the COVID-19 pandemic, reshaped stressors and required new strategies: '*The environment has shifted because of COVID. So the challenges have also shifted with the external environment*' (P14). They also emphasized that resilience evolved with age and career stage. Experience was said to bring perspective and emotional regulation: '*You get older, you … think "okay, that's not the end of the world"*' (P13). Early and mid-career educators, however, faced concurrent pressures across professional and personal domains: '*During this stage of your career, or during this stage of your life, you're facing stress from all different aspects*' (P16). These reflections show that resilience is dynamic, shaped by the interaction of personal growth, social role transitions, and contextual disruptions over time. Time intersects with the **Person** domain through accumulated psychological resources, with the **Process** domain through evolving relational needs, and with the **Context** domain through societal change.

Extended interpretations, sub-themes, and additional quotations for the **Time** domain are available in Supplementary Table 6.

Integrated results

Across the four domains of the PPCT model, resilience among medical educators emerged as a multi-layered phenomenon. In the **Person** domain, self-initiated strategies and structured supports provided individual foundations. The **Process** domain showed resilience as relational and co-constructed, through personal networks, collegial ties, mentorship, communication, and feedback. The **Context** domain emphasized how institutional systems, cultural climates, and broader societal structures either enabled or constrained resilience. Finally, the **Time** domain highlighted the dynamic nature of resilience, evolving across career stages and in response to major environmental disruptions such as the COVID-19 pandemic. Together, these findings reveal that resilience is not a fixed attribute but the product of continuous interaction between individual capacities, proximal processes, systemic contexts, and temporal change. This holistic framing underscores the need to approach resilience not as an individual burden, but as a shared developmental outcome shaped by environments, relationships, and time.

Discussion

To our knowledge, this qualitative study is the first in HK and East Asia to examine resilience among medical educators using Bronfenbrenner's PPCT model [21,22,28,29]. Our findings highlighted resilience as a dynamic developmental process shaped by the interaction of personal resources, relational processes and support, institutional structures, sociocultural contexts, and temporal shifts. This ecological framing extends understanding beyond individual coping strategies, emphasizing multi-level intervention points from self-reflection to organizational policy.

At the **Person** level, participants emphasized reflective self-awareness, expectation management, and emotional regulation as central to managing stress and maintaining engagement. These insights suggest that resilience can be strengthened through self-development interventions. Scholars advocate for activities such as reflective journaling and writing to enhance emotional intelligence and self-awareness [30–31]. In alignment with these findings, tools such as the Teacher Resilience Self-Reflection (TRSR) instrument could be adapted for medical educators to systematically identify and evaluate the

personal and contextual factors influencing their resilience [32]. Structured reflection of this kind parallels practices described by our participants and could offer targeted, individualized guidance. Similarly, the Stress Management and Resiliency Training (SMART) program has demonstrated preliminary efficacy among medical educators in the United States, though further investigation into its applicability to HK is warranted [33]. While resilience can be nurtured individually, our findings also highlighted its reinforcement through meaningful relationships, underscoring the interdependence of the **Person** and **Process** domains [34].

Although existing literature has primarily focused on individual-level strategies, the PPCT model illustrates the importance of addressing broader systems of influences [21–22]. Within **Proximal Processes**, personal and collegial support networks, mentoring and transparent communication emerged as critical for fostering trust and professional growth [1,2,4,35]. Social support interventions have shown moderate to strong effects in enhancing resilience [36] and research on the neurobiology of affiliation underscores the role of social interaction in enabling recovery and thriving under stress [37]. Participants in our study emphasized transparent communication – defined as clear, timely and inclusive exchanges across hierarchical levels - as a key relational process contributing to trust and resilience in academic medicine [1,35]. Limited evidence indicates that poor communication among colleagues, students, and superiors undermines resilience in primary care settings [38]. Strengthening student-teacher communication and feedback also provides opportunities for reflection and professional development [35]. However, hierarchical and collectivist norms in HK may constrain open dialogue [39–41], especially in multilingual environments. The cultural emphasis on harmony and deference to authority may discourage the expression of differing viewpoints, particularly in medical education where power dynamics are pronounced. These findings point to the need for culturally sensitive initiatives, such as cross-cultural communication training or confidential mentorship, to strengthen resilience in local settings.

The **Context Domain** highlighted the influence of institutional and systemic structures. Consistent with prior research, increased operational support (e.g. research funding, clinical teaching support) has been shown to improve medical educators' resilience and well-being [1–5,8–12]. Optimizing resources and streamlining administrative processes can alleviate workload pressures, allowing educators to focus on core responsibilities and personal well-being [5,10]. Involvement in curriculum reform also mirrors initiatives such as West and colleagues' (2014) small-group curriculum, which enhanced engagement and reduced burnout at work [42]. Supportive senior leadership remains a well-recognized factor in fostering resilience [3]. Institutions can further support medical educators' resilience through policies promoting work-life balance, equitable remuneration, logistical support for teaching, and recognition of educators' contributions [8–12,20,33]. These institutional factors are closely linked with opportunities for professional identity development and career advancement. Echoing prior studies, our participants highlighted that supporting professional identity and competency development not only builds confidence but also promotes job satisfaction and resilience [43–45].

Structural deficiencies in HK's healthcare system also affect medical educators' resilience. Resource limitations and bureaucratic processes risk undermining educators' well-being and compromise the delivery of quality education and patient care [46]. Addressing these barriers requires coordinated institutional and policy-level responses. Likewise, systemic pressures related to equity, diversity and inclusion (EDI) call for structural changes at both institutional and societal levels [1,10,48]. Institutions can foster resilience by implementing inclusive recruitment policies, providing cultural competency training, and raising EDI awareness through dialogue among teachers, students, and stakeholders [48].

Sociocultural norms strongly shaped medical educators' communication, professional identity, and teaching practices [1]. Participants described the impact of emotional restraint, hierarchical dynamics, and face-saving behaviors on resilience [10,47,49]. These qualitative findings aligns with our mixed-methods data, which showed significantly lower resilience scores among mid-career males (40–49 years). This group may internalize cultural expectations around emotional stoicism and limited help-seeking, exacerbating mid-career pressures. This triangulation underscores the importance of culturally adapted interventions, such as private reflection, confidential mentorship or individualized coaching, which may be more effective than approaches assuming open emotional expression [47,49]. Institutions can also promote cultural competence and critical reflexivity, fostering inclusive educational environments that support resilience [50–54].

Finally, the **Time** domain drew attention to the evolution of resilience-building strategies across life stages and external events. For example, the COVID-19 pandemic accelerated the adoption of new teaching modalities, demanding adaptability and innovation [8,47,49]. Career stage also shaped resilience: mid-career medical educators were particularly vulnerable. Mid-career educators may be

contending with a confluence of personal and professional stressors, such as family pressures, increasing workload, and a lack of professional recognition. These findings suggest that resilience-building interventions should be tailored developmentally, with mentorship and recognition programs particularly beneficial for mid-career educators. Continuous evaluation of resilience-building initiatives over time will be essential to ensure their effectiveness and sustainability.

Limitations

This study had several limitations. First, the sample was relatively small and drawn from specific HK institutions. As is typical in qualitative research, the transferability of our findings depends on whether readers find the contexts and experiences relevant to their own settings. Second, most participants were trained as physicians, which may not fully represent perspectives from other professional backgrounds within medical education. Third, as many participants were affiliated with university teaching hospitals, the experiences of those teaching in community or non-academic settings may be underrepresented. Finally, the relatively brief interviews, constrained by participants' demanding schedules, may have restricted the depth of narrative detail. While future research may benefit from exploring alternative formats, such as follow-up interviews, the data collected in this study yielded valuable insights and addressed our research question sufficiently.

Implications for practice and research

This study contributes an ecologically grounded framework for understanding resilience in medical education, extending the literature in East Asian contexts. By applying Bronfenbrenner's PPCT model [21–22], we highlight how resilience develops across personal, relational, institutional, and sociocultural domains over time. Triangulation with quantitative findings reinforces the model: for example, lower resilience among mid-career male educators corresponds with qualitative accounts of cultural expectations and systemic barriers at this career stage. These insights suggest the need for culturally sensitive, age-specific resilience interventions, such as private, individualized support or confidential mentorship.

Practically, institutions can implement several low-barrier, high-impact interventions to support resilience among their colleagues. These include structured mentorship, equitable recognition of teaching, balanced workload allocation, and opportunities for well-being activities. Protected time for interdepartmental dialogue may help foster a collegial culture of mutual support and professional development. Implementing these strategic changes signals institutional commitment to bolster resilience and well-being.

Beyond HK, our findings invite cross-cultural dialogue on resilience in medical education. Locally adapted approaches that respect cultural norms around hierarchy, communication, and emotional expression are likely to be more acceptable and impactful. Comparative research across contexts could broaden the global understanding of how resilience is fostered in diverse educational environments.

Conclusion

Resilience among medical educators is shaped by the interplay of personal, interpersonal, institutional, systemic, and temporal factors. Mapping these dynamics onto the PPCT model underscores the need for multi-level interventions, from supporting professional identity and recognition to fostering psychologically safe, collegial environments [21–22]. Tailoring strategies to educator demographics, career stages, and cultural norms enhances their relevance and effectiveness. Our findings point to practical avenues, such as recognition systems, workload balance, and culturally responsive communication, that institutions can implement to promote resilience. Given the increasingly multicultural makeup of the medical profession worldwide, culturally and contextually informed strategies are essential for developing sustainable, globally relevant approaches to resilience-building.

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Ethical approval

Approval was granted by the research ethics committee of the University of Hong Kong (ref: EA200136) and Joint Chinese University of Hong Kong-New Territories East Cluster Clinical Research Ethics Committee (ref: 2021.079).

Disclosures statement

The authors report that there are no competing interests to declare. C.R. Whitehead is the holder of the BMO Financial Group Chair in Health Professions Education Research at University Health Network.

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Data availability statement

The dataset is available from the corresponding author upon reasonable request.

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