BMC Medical Education

RESEARCH

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The impact of mentoring relationships on professional identity formation in medical education: a systematic review

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Abstract

Background The promise that enduring and personalised mentoring relationships shape how mentees think, feel and act as professionals, or their professional identity formation (PIF), and thus how they interact, care and support patients and families has garnered significant interest. However, efforts to marshall these elements have been limited due to a lack of effective understanding. To address this lacunae, a systematic scoping review was carried out to map current knowledge on mentoring relationships and its impact on PIF.

Methods Guided by PRISMA guidelines and the Systematic Evidence-Based Approach (SEBA) to ensure a consistent and reproducible review, independent searches and appraisals of relevant articles published between 1st January 2000 and 4th December 2024 on PubMed, Embase, ERIC and Scopus databases were performed. Data from included articles were content and thematically analysed. Related themes and categories were combined using the SEBA methodology.

Results 248 articles were identified across four databases and snowballing of key articles. A total of 27 articles were included. The domains identified were: (1) the mentoring ecosystem; (2) mentoring dynamics; (3) shifts in belief systems and professional identity; and (4) complex adaptive systems.

Conclusions The mentoring programme can be seen as a mentoring ecosystem, functioning as a community of practice and supporting the socialisation process within its boundaries and along the mentoring trajectory. The culture and structure of the mentoring ecosystem help inculcate the shared belief systems and programme identity. It also nurtures stakeholder investment and commitment, as well as their internal compass which is key to contending

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with the complex array of influences upon their development. Through the lens of a complex adaptive system, it is also possible to appreciate transitions between roles and responsibilities and the notion of being and becoming. These findings underline the evolving nature of practice and the need for personalised and longitudinal mentoring support.

Keywords Mentoring relationships, Mentoring, Medical schools, Medicine, Professional identity formation, Personhood, Community of practice, Socialisation process

Background

The success of mentoring in shaping how mentees "*think, act, and feel like a physician*" [1], or their professional identity formation (PIF) [2], has been attributed to its ability to nurture personalised and enduring mentoring relationships [3–6]. If mentoring and learning relationships are key to fostering effective PIF, understanding how such relationships are able to achieve this feat would be essential to the design of education initiatives beyond the mentoring sphere.

With new data highlighting the impact of maturing mentoring relationships influenced by the mentoring environment [3, 5, 7, 8], a better appreciation of the complex nature of mentoring relationships is required to enhance the design, knowledge, skill and assessment practices in mentoring and wider educational practices.

Here, the conceptualisation of mentorship and mentorship programmes within medical education is integral to this review. Mentorship is defined as *"a dynamic, context-sensitive relationship rooted in shared professional and personal interests, in which an experienced individual supports the growth of a less experienced mentee, fostering development and enrichment for both mentor and mentee"* [9]. Mentorship programmes, typically overseen by host organizations, are referred to as structured, goal-oriented initiatives designed to support the deliberate development of mentees through the guided transfer of knowledge, skills and values [10].

Theoretical Lens

A constructivist ontological and relativist epistemological position was adopted in recognition of mentoring relationship existing as a social construct, influenced by both individual and contextual considerations [11–13]. These considerations are detailed in Table 1 below.

The influence of these cultural and contextual considerations reshapes individual belief systems within the four key domains of personhood, or 'what makes you, you.' The Ring Theory of Personhood (RToP), a clinically evidenced framework [78, 79], and the Krishna-Pisupati Model of Professional Identity Formation (KPM) [3, 5, 11] were used to sketch changes in identity critical to efforts in supporting, guiding, assessing and overseeing progress and PIF.

The ring theory of personhood

The RToP considers the experiences of one stakeholder. Most often, this is the mentee's perspective on changes in their Innate, Individual, Relational and Societal belief systems which reflect changes in their self-identity [3, 5] (Fig. 1).

The RToP suggests that a better appreciation of spirituality-based changes in the Innate Ring's belief systems; autonomy-centred aspects within the Individual Ring; relational ties and societal expectations in the Relational and Societal Rings [20] respectively will help shepherd identity formation.

The Krishna-Pisupati model

Changes in the belief systems are brought about by the introduction of new belief systems (*event*) that may resonate or conflict with regnant belief systems. Awareness of an *event* (*sensitivity*) precipitates *judgement* into the significance of the *event* and a determination as to the *willingness* to resolve the *event*. The balancing process considers the *willingness* and *judgement* of the significance of the *event* and weighs these against the sometimes-competing considerations of the stakeholder's competence, experience and availability in the creation of a context-specific self-concept of identity as outlined in Fig. 2.

Methods

The PRISMA-compliant Systematic Evidence-Based Approach (SEBA) was adopted as the underlying methodologic framework for this systematic scoping review (see Additional File 1). Comprising six distinct stages, SEBA's constructivist perspective and relativist lens accommodate the context-specific and socioculturally sensitive nature of mentoring, enabling a multi-angled mapping of existing literature for a consistent and reproducible review. The stages of SEBA are depicted in Fig. 3.

Stage 1 of SEBA: A systematic approach

To enhance reproducibility and accountability of the research process, the stages of SEBA were guided and supported by an expert team [80, 81]. This comprised medical librarians, local educational experts and clinical practitioners from the Yong Loo Lin School of Medicine, the National Cancer Centre Singapore, the Palliative Care Institute Liverpool and Duke-NUS Medical School.

Table 1 Individual and contextual considerations

Individualised	Contextual
• Working styles, opportunities [14], attitudes, emotions, experience, skills, goals, demographic [15, 16], socio-cultural [17–19] and psycho-emotional features [15] • The physician's meaning-making on the background of their belief systems, adaptation, and development; the importance placed on an interaction or specific incident; level of resilience and psycho-emotional status [11, 20]; and the available support that impact their responses [21–23]	• The mentoring programme's setting in a formal or informal curriculum, working hours [24], rules [25], disciplinary consequences [26], programmes [27, 28], attention to PIF [29–31], administrative support [33], faculty training and evaluation [32, 33], access to personalised support and communication networks, hidden curriculum [30, 34–43], prevailing discourses [38, 44–47], daily activities [36, 48, 49], and rites of passage [1, 41, 43, 50–55] (*curricula determined by host organisations*). • The programme's learning objectives [56], goals [57, 58], timelines and professional standards [59, 60], codes of conduct, expectations [61, 62], implicit norms [63], culture [64], sociocultural norms and legal requirements [65–68] • Accessible communication and flexible and personalised longitudinal support [3, 5–7, 12, 20, [69–77]

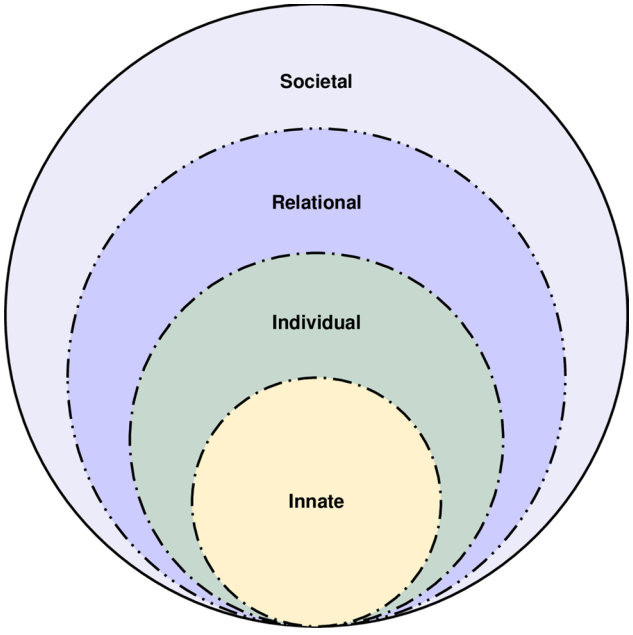

Fig. 1 The Ring Theory of Personhood

Determining the title, research Question(s) and inclusion criteria

The Population, Intervention, Comparison, Outcome, Study Design (PICOS) framework guided the primary research question, '*What is known about mentoring relationships in medical education and its impact on professional identity formation?*' and secondary questions, '*How, in terms of the exact mechanisms, do mentoring relationships influence professional identity formation?*' and '*What specific aspects of mentoring relationships influence professional identity formation?*' (Table 2).

Searching

The research team conducted independent searches on PubMed, Embase, ERIC and Scopus databases. In trying to achieve an up-to-date review and given time and manpower constraints, we confined the search to articles published between 1st January 2000 and 4th December 2024. The research team opted to include studies published from the year 2000 onward to achieve balance between conducting a thorough review and ensuring that the included studies reflected current perspectives and practices in mentoring. To further enhance the review, 'snowballing' of references from the selected articles was performed, including through the use of artificial intelligence tools such as GPT and Elicit. An example of the search strategy is detailed in Table 3 below.

Extracting and charting

Subsequently, the research team independently reviewed titles and abstracts using Endnote. This allowed for a shortlisting of articles, for which the full texts were reviewed. *"Negotiated consensual validation"* [82] was practiced to reach consensus on the final list of included articles. These list of articles are detailed in Additional File 2.

Stage 2 of SEBA: split approach

Three independent teams then concurrently analysed the included full-text articles for a robust and comprehensive review. This involved the simultaneous application of Braun and Clarke's [83] thematic analysis and Hsieh and Shannon's [84] directed content analysis. The combined use of these approaches facilitated a shared understanding of terminology amongst various team members and addressed the limitations of each method of data analysis [85]. For example, contradictory data and negative findings often overlooked in thematic analyses are effectively accounted for in content analysis [83].

The first team summarised and tabulated the included articles, in keeping with Wong et al.'s [86] 'Realist and Meta-narrative Evidence Syntheses - Evolving Standards (RAMESES) publication standards' and Popay et al.'s [87] 'Guidance on the conduct of narrative synthesis in systematic reviews'. This ensured that elemental details of the articles were captured.

The second team thematically analysed the articles, employing an inductive approach to construct 'codes' from the text's immediate meaning [83]. This iterative process saw new codes linked to prior ones, ensuring that fresh themes were derived directly from the raw data without any pre-existing groupings [88].

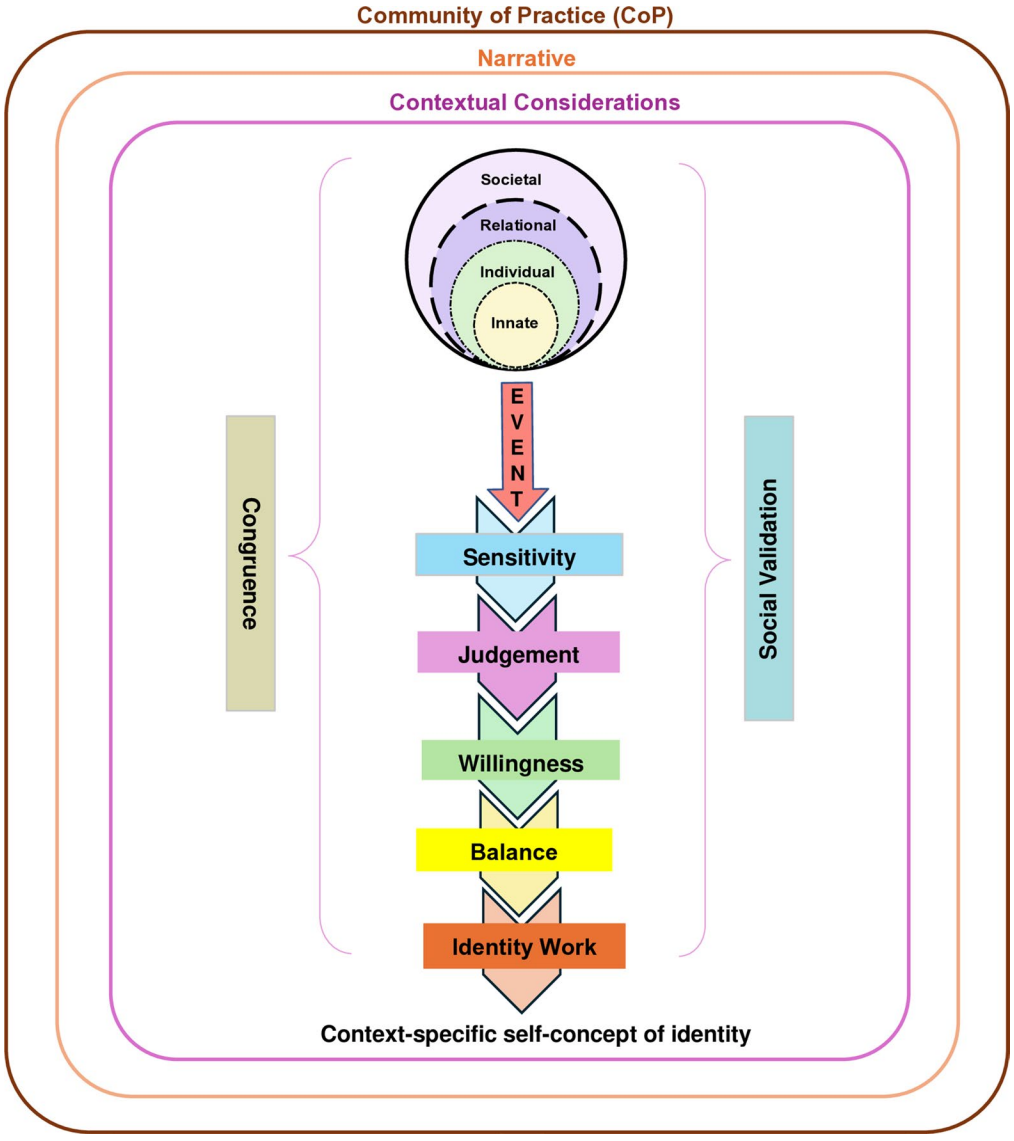

Fig. 2 The Krishna-Pisupati Model for Professional Identity Formation

The third team of researchers performed Hsieh and Shannon's [84] directed content analysis, utilising predetermined codes from Venktaramana et al.'s [70] review entitled, 'Understanding mentoring relationships between mentees, peers and senior mentors' and Sng et al.'s [89] review entitled, 'Mentoring relationships between senior physicians and junior doctors and/or medical students: A thematic review' to guide data analysis.

Similarly, *"negotiated consensual validation"* [82] was used to agree upon the end products of this triadic approach.

Stages 3 and 4 of SEBA: Jigsaw perspective and funnelling process

Overlapping or complementary pieces were merged to create bigger puzzle pieces, referred to as themes/categories. These themes/categories were then compared with the tabulated summaries to ensure that key information was retained whilst minimising omissions. Overarching domains were subsequently identified.

Stage 5 of SEBA: analysis of Evidence-Based and Non-Data-Driven literature

Efforts to minimise the plausibility of bias from non-data-based articles (grey literature, opinion, perspectives, editorial, letters) were seen in the comparisons made between evidenced-based and non-data-based publications. Found to yield similar data, the research team concluded that there was minimal bias from non-data-driven literature.

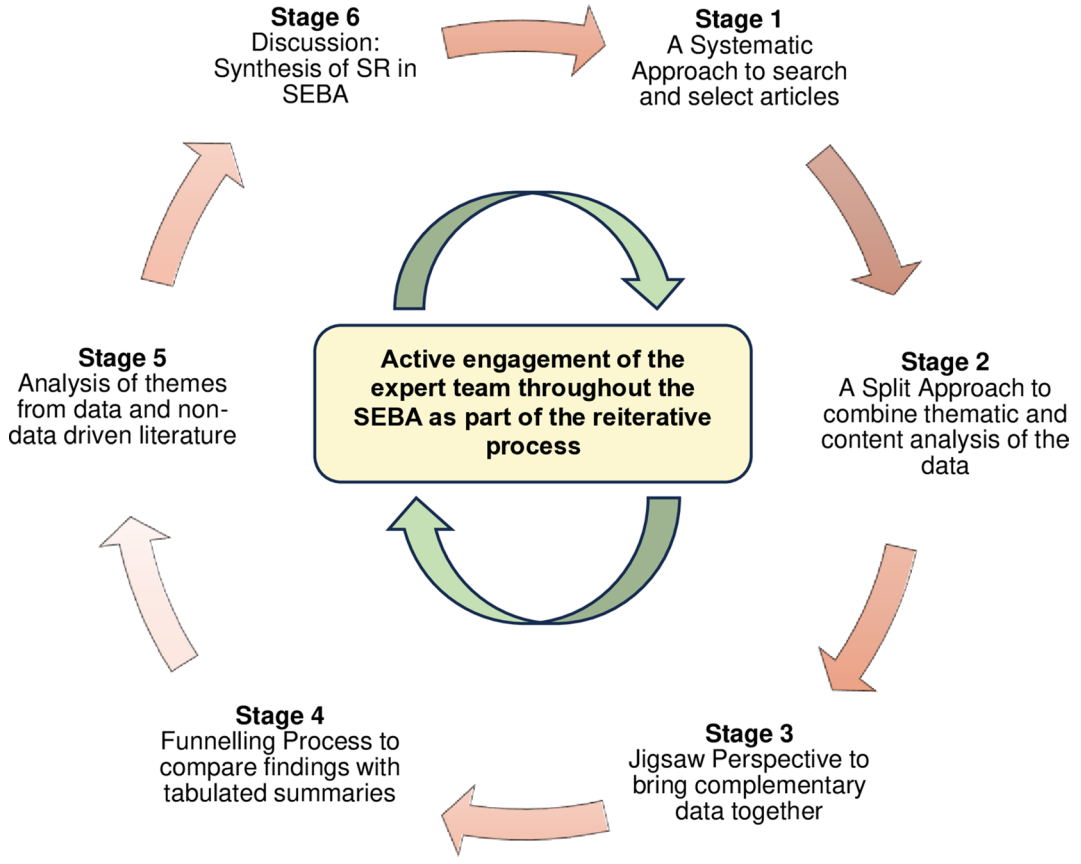

Fig. 3 The SEBA Process

Table 2 Population, intervention, comparison, outcome and study design (PICOS) framework, inclusion and exclusion criteria applied to database search

PICOs	Inclusion	Exclusion
Population	Physicians, junior physicians, residents and medical students	Allied health specialties (e.g. nursing, psychology)
Intervention	Accounts of mentoring involving junior physicians, residents and/or medical students mentored by seniors aimed at advancing professional and/or personal development of the mentee with specific analysis on the role of the mentoring relationship	Peer-mentoring, mentoring patients, or mentoring by patients
Comparison	Comparisons between mentoring programmes, editorials and perspectives, reflective, narratives and opinion pieces	
Outcome	Personal outcomes of mentoring Professional development of outcomes Career-related outcomes Research and academia outcomes	
Study design	All study designs are included	

Table 3 Search strategy for pubmed database

PubMed Search Strategy
("Mentors"[Mesh] OR mentor*[tiab]) AND ("Education, Medical"[Mesh] OR "Schools, Medical"[Mesh] OR "Students, Medical"[Mesh] OR "medical student*"[tiab] OR "medical school*"[tiab] OR "medical educat*"[tiab] OR "medical undergraduate*"[tiab] OR "medical postgraduate*"[tiab]) AND ("relation*" [tiab] OR "interaction*"[tiab] OR "dynamic*"[tiab] or "interpersonal"[tiab] or "inter-personal"[tiab] or "connection*"[tiab]) AND ("Professional identi*"[tiab] OR "Social Identification"[Mesh] OR "Socialization"[Mesh] OR "Social Identification"[tiab] OR "socialisation"[tiab] OR "socialization"[tiab])

Stage 6 of SEBA: synthesis of SSR in SEBA

Synthesis of this discussion waas guided by the Best Evidence Medical Education (BEME) Collaboration guide and the STORIES (STructured apprOach to the Reporting In healthcare education of Evidence Synthesis) statement [90, 91].

Results

248 articles were identified across four databases, with an additional 13 articles retrieved through hand-searches and snowballing of references. 157 non-duplicate titles and abstracts were reviewed, leading to 42 full-text reviews and a final inclusion of 27 articles (Fig. 4).

Characteristics of included articles

Eight reviews, five commentaries, five quantitative studies and nine qualitative studies were included in this study. Amongst the five quantitative studies, Anurat et al. [77] utilised validated survey tools, such as Mentor Behaviour Scale, the Maslach Burnout Inventory Student Survey and the Professional Self -Identity Questionnaire. Chen et al. [92] utilised a usability survey regarding its novel mentorship mentoring platform. Heeneman and de Grave [69] designed and validated their mentorship experience tool for mentors and mentees whilst Kusner et al. [93] similarly designed a mentorship experience survey tool for mentors and mentees. Krishna et al. [8] designed content valid survey tools using a Modified Delphi approach with open-ended questions to understand mentoring experiences on the basis of mentoring stages. Qualitative interviews were carried out on both mentors [51, 74] and mentees [3, 5, 7, 70, 72, 75, 94] to understand

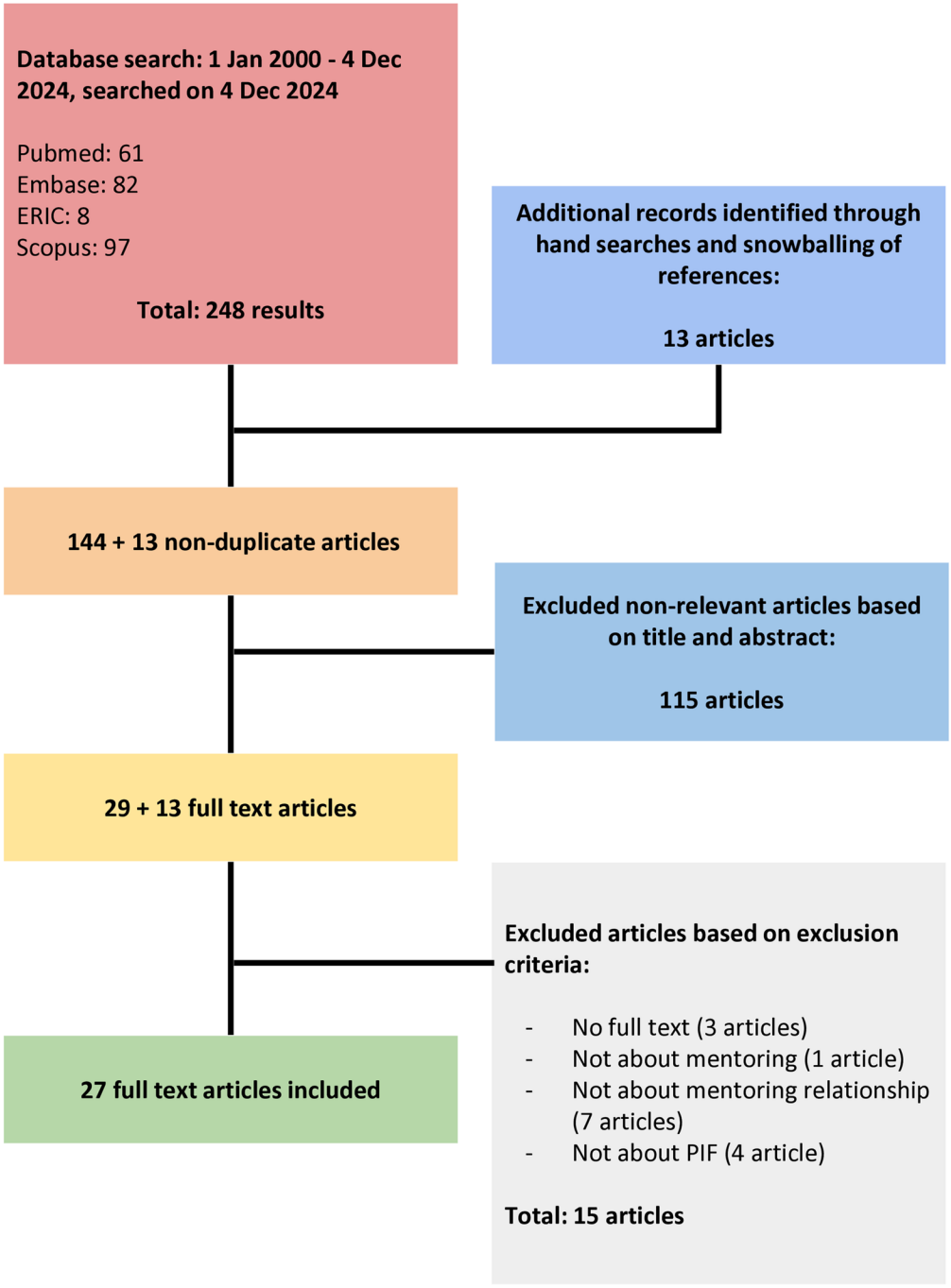

Fig. 4 PRISMA Flowchart

their mentoring relationships and impact on professional identity formation. Uniquely, five of the interview studies involved a research-based mentoring programme with near-peer mentors and senior mentors [3, 5, 7, 70, 72].

The key domains identified were: (1) the mentoring ecosystem; (2) mentoring dynamics; (3) shifts in belief systems and professional identity; and (4) complex adaptive systems.

Domain 1. The mentoring ecosystem

Personalised and enduring mentoring relationships are nurtured in mentoring ecosystems. A mentoring ecosystem is scaffolded on three key elements. One, the mentoring programme must function as a community of practice (CoP), or *"a persistent, sustaining social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values and history and experiences focused on a common practice and/or enterprise"* [95]. This creates discrete boundaries made up of the programme's inclusion and membership criteria, goals, compliance of mentoring standards, codes of practice, professional guidelines and expectations, ethical principles and medicolegal requirements [3, 5, 8, 51, 70, 72, 75–77, 93, 96–100]. These features also guide the mentoring trajectory [1, 3, 5, 6, 51, 69–72, 76, 97–100].

Two, the mentoring trajectory—framed by competency-based mentoring stages and supported by a longitudinal mentoring umbrella-based support mechanism and communication, assessment and feedback channels—shapes the mentoring ecosystem [1, 3, 6, 51, 70–72, 76, 97, 98, 100]. Progress along the mentoring trajectory maps achievement of stage-specific milestones [3, 5, 8, 70, 72, 76, 96, 97, 101].

Three, the mentoring ecosystem is also defined by its culture that is shaped by *individual*, *contextual*, *evolving* and *host organisational considerations*. The *individual considerations* refer to the stakeholder's narratives, belief systems, psycho-emotional state, coping strategies and maturing mentoring relationship and competencies [1, 3, 5–7, 51, 69, 70, 72, 76, 98–101]. *Contextual considerations* include formal, informal and hidden curriculum; codes of conduct; access to personalised, appropriate and longitudinal mentoring support; assessment and remedial guidance [1, 3, 5, 8, 20, 69, 72, 75, 76, 92, 93, 96, 97, 99, 101]. The *evolving considerations* include growing personal and professional experience and competencies; maturing mentoring relationships; the cumulative effects of reflections and meaning-making exercises; deeper association and sense of belonging; and shifting belief systems [1, 3, 5–7, 12, 51, 70, 72, 74–76, 98–100]. The *host organisational considerations* encompass organisational support for mentoring assessments, mentor training and maintenance of the mentoring environment [6, 69, 93, 96–98].

Domain 2. Mentoring dynamics

Within the confines of a well-structured and supported mentoring ecosystem, enduring and personalised mentoring relationships flourish [8, 69, 70, 72, 76, 96, 97, 100] as mentees are provided with guided immersion into the mentoring culture under the watchful eye of trained mentors [1, 5–7, 12, 51, 70–76, 98–101]. Guided by the mentoring trajectory and supported by role modelling, coaching, supervision, counselling and personalised mentoring support, trained faculty introduce and integrate *"the characteristics, values, and norms of the medical profession"* [102] through which mentees learn to effectively navigate the mentoring ecosystem by internalising its values and norms. The new belief systems and guidance provided sets expectations, guides interactions and shepherds the mentee from legitimate peripheral participation to more central roles in the programme as belief systems inculcated begin to take 'root', promoting investment in the mentoring relationship [5, 16, 73–75, 77].

Domain 3. Shifts in belief systems and professional identity

Rooted belief systems inform the mentee's personal and professional development [1, 3, 5–7, 51, 70, 72, 76, 98–100]. However, this process of professional identity formation is non-linear, evolving and adaptive—shaped by new experiences, challenges and the mentee's ability to detect, evaluate and address conflicts between current and new belief systems [7, 98–100]. Mentors support this process by helping mentees develop their *internal compass*, or guiding values, beliefs and principles [1, 3, 5–7, 12, 51, 70, 72, 74–77, 98–101].

Domain 4. Complex adaptive systems

Meaning-making, development of the *internal compass*, evolution of identity formation and creation of a context-dependent sense of identity are highly individualised and dependent upon organisational or environmental, stakeholder and relational facets of mentoring relationships.

Organisational factors include structured, multi-staged competency-based mentoring stages [3, 5, 8, 70, 72, 76, 96, 97, 101] that reveal changing expectations, milestones and shifts in thinking and competencies; the presence of an evolving but safe and nurturing mentoring environment in medicine's hierarchical society [3, 8, 20, 75–77, 96, 97, 101]; formal and informal matching processes within the curricula [3, 8, 20, 70, 72, 76, 92, 93, 97]; resource variations; organisational and programme bureaucracy and access to trained faculty. These spotlight yet more variables to current interactions [12, 20, 96]. Krishna et al. [96], Anurat et al. [77] and Chen et al. [92] suggest that these variables have meaningful effects on the development of trusted mentoring interactions [20, 69, 72, 75, 76, 92].

Similarly, mentor-related factors, such as growing clinical knowledge; developing communication, debriefs, facilitation and leadership skills; maturing competencies [12, 69, 70, 72, 74–76]; shifts in personal and professional practice [69]; variations in motivation, engagement and availability as a source of social, professional and personal support [3, 5–7, 12, 20, 69–77, 101]; and the ability to build a sense of community [12, 69, 72, 76, 92, 93, 101], introduce yet more unpredictability in the mentoring relationship [5, 69, 72, 75, 76, 92].

Mentee-related factors, including developing trust, psychological safety [20, 69] and willingness to access available support, also underscore the complexities behind mentoring relationships.

Teo et al. [76] argue that the variable factors influencing identity work call into question current reliance on assessment tools built on *"Cartesian reductionism and Newtonian principles of linearity"*. In truth, such a linear cause-and-effect model is fundamentally flawed and fails to consider the unique influences, personalised responses and complex adaptations at play within a multi-stakeholder mentoring relationship; the effects of feedback loops; and the stakeholder's psycho-emotional and contextual shifts, variations, availability of mentoring support and overall engagement in the mentoring process. Teo et al. [76] suggest that such complex interactions may be better understood through the lens of a complex adaptive system (CAS) [7, 76]—the *"dynamic interactions and variable interrelationships between and among their components that reverberate throughout the system"*. Indeed, Teo et al. [76] evidence the presence of defining characteristics of CAS in mentoring relationships, adding weight to their calls to change the manner that mentoring relationships are seen, understood and supported.

Dicussion

In addressing its primary research question, this SEBA-guided review provides a unique perspective of developing mentoring relationships within a CoP-like mentoring ecosystem. Offering clear boundaries, a spiralled curriculum that guides a mentee from legitimate peripheral participation to a more central role and a mentoring culture that nurtures and supports the mentoring trajectory, a mentoring ecosystem scaffolds the socialisation process—providing the two essential elements in the development of PIF.

This SEBA-guided review proceeds to strengthen the role of mentoring relationship in scaffolding a mentee's identity formation and professional development by underlining the importance of effective matching and an alignment of expectations in initiating mentoring relationships. Supported by guided immersion and longitudinal role modelling, supervision, coaching and counselling and personalised mentoring, the mentoring ecosystem, replete with its unique culture, builds individualised mentoring relationships. This longitudinal mentoring support paralleling the mentoring trajectory sustains engagement and encourages investment in the programme and instils common belief systems. As the programme's shared identity takes root and becomes a part of the stakeholder's core identity, these rooted belief systems and shared identity increase identification with the programme and inspires greater investment in the programme—allowing enduring and personalised mentoring relationships to blossom (Fig. 5).

This is part of the notion of *becoming*, where progress through the stages of the mentoring process, in tandem with guided reflections and discussions, supervised debriefs, timely feedback, and mentored meaning making, embed the programme's belief systems and identity.

This building of the *internal compass* is critical to guiding thinking, decisioning and actions in resolving *events* or *dissonance* between new and prevailing belief systems and practices. The rooted belief systems and shared identity underpinning the *internal compass* increase identification with the programme and inspires even greater investment in resolving *events* and nurturing personalised and enduring mentoring relationships. Indeed, during an *event* (Point 2 in Fig. 5), a combination of the *internal compass* and policing regnant codes of conduct, professional guidelines and psychosocial expectations by the host organisation and the mentor helps identify the *dissonance* between new and prevailing belief systems—guiding the mentee as they review, reflect and make sense of their experiences and plan and execute a response. In some instances, the host organisation and mentors may be required to remediate these responses and shepherd the deviating mentoring relationship back towards the desired trajectory.

Over time, along the mentoring relationship, the *internal compass* matures (Point 3 in Fig. 5). This maturing notion of the *internal compass* remains relatively constant, even in the face of more changing conditions and different influences. Greater insights, feedback, reflections, reviews, experience, competency and experience add more layers of nuance to thinking, decisioning and conduct—underscoring a fledging sense of professional identity. It also accompanies a shift from legitimate peripheral participation to more central roles. This notion of a maturing *internal compass* alludes to another key finding. Sarraf-Yazdi et al. [2] posit that PIF is a continuous process of finessing and growing. Adding to this sense of *becoming* is also the practical notion of *being* an expert or, in this case, a senior mentor. However, rather than a fixed state of *being*, the role of senior mentor evolves. A senior mentor and local expert may have to take on the role of a relative novice in different settings. This demands the senior mentor strive to re-achieve an

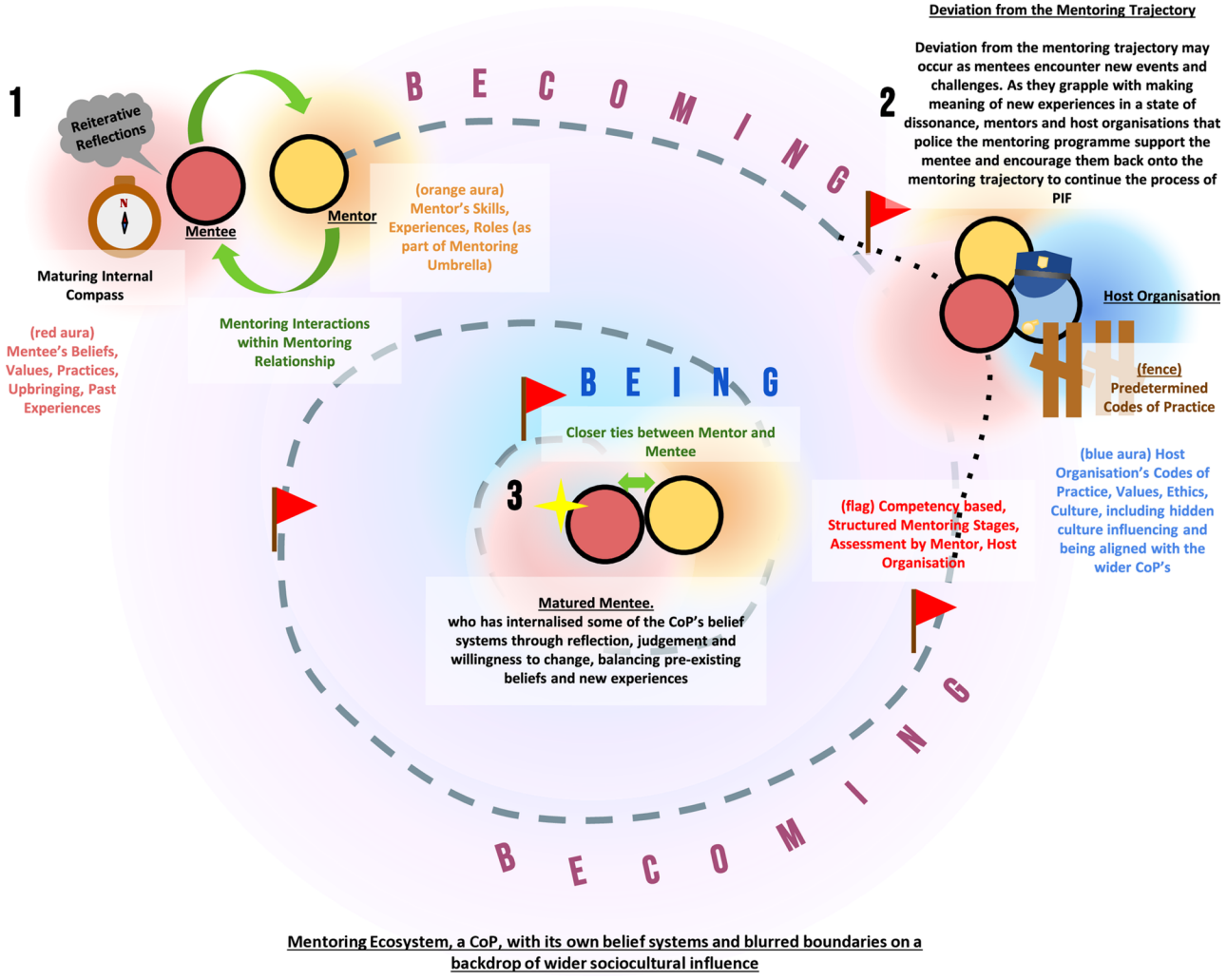

Fig. 5 Navigating the Mentoring Trajectory on the Background of a Wider Mentoring Ecosystem

expert status. Changeability between expert and novice or some roles in between creates the sense of *being and becoming*. The concept of *being and becoming* highlights an evolving concept of professional identity that dismisses professional identity as a destination. It also reiterates the notion that professional development is a lifelong process.

Evidence of vacillations between *being and becoming*, evolving notions of personhood and identity and a maturing *internal compass* underscore the presence of a complex process. Evidence of multiple stakeholders interacting, adapting, co-evolving or mutually transforming in the face of changing circumstances, growing experience, shifting and e*volving individual*, *contextual* and *host organisational considerations* underscores evidence of mentoring relationships as a CAS.

Viewing mentoring relationships as CAS helps explain the impact of the rootedness of shared belief systems, gradual integration of shared identity and the development of enduring and personalised mentoring relationships. System adaptation or the ability to modify itself to maintain stability, optimise performance, or achieve objectives in light of practice changes, developing competencies, greater insights and nous, feedback loops and changing conditions also evidence features of self-organisation and emergent behaviour that extend beyond path dependency or the effects of past experiences and training. These features reflect more than the presence of a CAS, encapsulating the critical role of continued engagement and investment in the mentoring relationships that is elemental to creating enduring and personalised mentoring relationships. This is fundamental to the success of mentoring in the face of various influential factors swaying the progress of the mentoring relationship.

Implications for practice

Our findings position mentorship as a powerful enabler of PIF in medical education, offering several practical

implications for the design and implementation of effective mentorship programmes. To meaningfully support PIF, mentorship must embrace a holistic, personalised and longitudinal approach that encompasses the mentee's evolving personal and professional identities.

Mentorship is found to be most impactful when it affirms competency, aligns expectations and fosters psychologically safe spaces for reflection and vulnerability. These elements can be actively cultivated through mentor training, structured check-ins and the development of clear communication frameworks. Moreover, as personal and professional identities are inseparably entwined, mentorship programmes should be intentionally designed to support the whole person. This is, after all, mentoring's biggest strength—its unique ability to extend beyond formal training and provide personal support, serving as a developmental anchor throughout one's career. Mentorship programmes should therefore build in continuity beyond training milestones, integrating mentorship into continuing medical education and career development pathways. Whilst it is clear further studies are warranted, mentoring has shown particular promise in delivering longitudinal, personalised support that bridges formal training and lifelong professional growth.

Limitations

Small sample sizes, limitations posed by an inclusion criterion focused on publications in English and the use of predominantly Western-based data limit the applicability of these findings to other settings and healthcare and educational models.

Conclusion

The implications of a maturing *internal compass* and sense of *being and becoming* are far-reaching. To begin, these concepts underscore the need for effective policing and support of programme boundaries; importance of consistency in the mentoring programme's structure, practice, identity and shared belief systems; necessity for a curated mentoring programme and culture; demand for continued stakeholder engagement; and significance of effective assessments. The data also underlines the CoP-like structures, and guided immersion into the structured programme. This, in turn, underscores the necessary resources for longitudinal and personalised mentoring support.

Overall, the proffering of these insights underlines the need for further study which ought to begin with longitudinal studies and evaluation of the changes in PIF through the lens of the RToP and the KPM. This then will be the focus of our coming work.

Abbreviations

PIF	Professional Identity Formation
RToP	Ring Theory of Personhood
KPM	Krishna-Pisupati Model for Professional Identity Formation
SEBA	Systematic Evidence-Based Approach
PICOS	Population, Intervention, Comparison, Outcome, Study Design
CoP	Community of Practice
CAS	Complex Adaptive Systems

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-07158-y.

Supplementary Material 1: PRISMA-ScR Checklist

Supplementary Material 2: Tabulated Summary of Included Articles

Acknowledgements

The authors would like to thank Annelissa Chew Chin for her expert guidance and advice in designing our search strategy. The authors would like to dedicate this paper to the late Dr. S Radha Krishna and A/Prof Cynthia Goh whose advice and ideas were integral to the success of this review and Thondy, Maia Olivia and Raja Kamarul whose lives continue to inspire us.The authors would also like to thank the anonymous reviewers for their helpful comments which greatly enhanced this manuscript.

Author contributions

All authors LKRK, NR, HYFK, XYT, JS, EYML, DWJW, TYL, ACWJ, LCJN, NYK, AAT, JRL, ALYD, ELYQ, LTN, SPL, SPR, JKL, VR, VJEF, RG, NABAH, CL, EKO, SSW, SM and YKO were involved in data curation, formal analysis, investigation, preparing the original draft of the manuscript as well as reviewing and editing the manuscript. All authors have read and approved the manuscript.

Funding

No funding was received for this review.

Data availability

The datasets supporting the conclusions of this article are included within the article and its additional files.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 20 June 2024 / Accepted: 9 April 2025
Published online: 19 April 2025

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