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Nurturing medical professionalism in different cultural contexts

Edited by
Kamran Sattar, Kate Owen and Bhavani Veasuvalingam

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Nurturing medical professionalism in different cultural contexts

Topic editors

Kamran Sattar — King Saud University, Saudi Arabia

Kate Owen — University of Warwick, United Kingdom

Bhavani Veasuvalingam — International Medical University, Malaysia

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Lynn Valerie Monrouxe,
The University of Sydney, Australia

*CORRESPONDENCE
Kamran Sattar
✉ drkamransattar@gmail.com

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Editorial: Nurturing medical professionalism in different cultural contexts

Kamran Sattar[1]*, Kate Owen[2] and Bhavani Veasuvalingam[3]

[1]College of Medicine, King Saud University, Riyadh, Saudi Arabia, [2]University of Warwick Medical School, Coventry, United Kingdom, [3]IMU University, Kuala Lumpur, Malaysia

KEYWORDS

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Editorial on the Research Topic
Nurturing medical professionalism in different cultural contexts

Medical professionalism is not governed by static rules; rather, it represents a dynamic and evolving ecosystem. Within the context of our Research Topic, *Nurturing Medical Professionalism in Different Cultural Contexts*, this ecosystem is shaped by the continuous interaction among individual psychology, institutional culture, and societal context.

At the Individual Level (Psychological Foundations), three papers illustrate the internal development of professionalism. Sattar et al. present professionalism as a psychological buffer against burnout, Zeng et al. demonstrate that personality traits influence critical thinking, a core professional skill, and Al-Obiedat et al. extend this understanding to nursing, highlighting empowerment as the psychological fuel for professional satisfaction. Collectively, these studies indicate that professionalism extends beyond behavioral compliance, requiring psychological resilience and empowerment as essential foundations.

The Institutional Level (Hidden and Explicit Curricula) examines how institutions shape professionalism through both formal instruction and the hidden curriculum. Guraya et al.'s PROPER framework directly addresses the hidden curriculum, Sadeq et al.'s systematic review identifies gaps in explicit teaching strategies, and Pandya et al. demonstrate that faculty development can bridge these gaps, rendering professionalism a teachable rather than an assumed construct. This level underscores how institutional culture may either reinforce or erode individual psychological foundations.

The Societal Level (Cultural Context and Justice) expands the analysis to broader cultural and social justice considerations. Iqbal et al. reveal how assessment bias reflects societal inequities, Haque et al. reframe language diversity as an educational opportunity rather than a barrier, and Mohammed et al. illustrate how student-led initiatives can challenge systemic discrimination and promote inclusive professional environments. The following sections provide further elaboration on the specific details derived from these papers.

Empowerment and quality of work life in nursing

Al-Obiedat et al. examine the psychological empowerment and quality of work life among Jordanian nurses and midwives. Their study reveals a strong positive correlation between empowerment and professional satisfaction, indicating that

supportive work environments and autonomy are not only HR concerns but central to professional behavior and job retention. Their findings advocate for investment in nurse empowerment as a strategic approach to enhancing healthcare quality.

Professionalism, mental health, and coping

Building on this theme of professional wellbeing, Sattar et al. explore how professionalism, mental health, and coping strategies interact among medical students in Malaysia. Their structural equation modeling demonstrates that professionalism buffers against burnout and is positively linked to empathy through adaptive coping strategies. These findings reinforce the idea that professionalism is dynamic, shaped by psychological resilience and institutional support.

Uncovering the hidden curriculum

Yet professionalism is not shaped solely by formal instruction. Guraya et al. turn attention to the hidden curriculum, unspoken cultural norms that may undermine formal professionalism teaching. Their realist-informed PROPER framework, implemented in two European medical schools, addresses these covert influences. This initiative illustrates that professionalism is best fostered when both the explicit and hidden curricula align to support ethical, reflective practice.

Assessing professionalism: context matters

In assessing professionalism, context remains crucial. Iqbal et al. evaluate situational judgment tests (SJTs), such as Casper, uncovering that assessor bias and cultural interpretations can influence scoring, even when such tools are intended to measure universal professional attributes. Their work underscores the need for fairness and validity in evaluation, especially across diverse applicant pools.

What we know about teaching professionalism

A broader view of professionalism instruction is offered by Sadeq et al., who provide a systematic review of educational interventions. While many report positive outcomes, the review highlights methodological inconsistencies and a lack of sustainability in current approaches. These limitations point to the urgent need for contextually responsive, long-term strategies that support meaningful professional identity formation.

Faculty development: professionalism as a learnable skill

Just as students play a role in shaping professionalism, so too must educators. Pandya et al. detail a faculty development workshop in India that reframed professionalism as a teachable, rather than inherent, quality. Targeted at new faculty, the workshop integrated contemporary theories of professional identity formation. Feedback revealed increased confidence in modeling and teaching professionalism, affirming that faculty development is essential to nurturing these values.

Personality and critical thinking in China

Further highlighting the complexity of professionalism, Zeng et al. conducted a multicenter study across Chinese medical schools to examine how personality traits and self-differentiation influence critical thinking, a core professional skill. Their findings call for pedagogical strategies tailored to students' psychological profiles and cultural contexts to foster critical thinking effectively.

Language as an educational resource

Haque et al. contribute another dimension by reframing language barriers as learning opportunities. In a UK-based intervention, non-English consultations in general practice became sites of professional growth. Structured reflection and faculty guidance helped students build empathy and cultural competence, showing how real-world challenges can become powerful educational experiences.

Challenging islamophobia through student-led teaching innovation

Mohammed et al., in an innovative contribution, present a student-led case-based learning (CBL) initiative that tackled issues of discrimination and microaggressions faced by Muslim medical students in the UK. This intervention, grounded in real-life scenarios, aimed to promote inclusivity and cultural literacy among faculty and students alike. Facilitated by Muslim students with prior experience in curricular innovation, the sessions illuminated challenges such as inadequate prayer spaces, discriminatory clinical attire policies, and weak institutional support systems. Thematic analysis of discussion transcripts, participant feedback, and facilitator reflections revealed five major insights: the need for improved staff and student cultural literacy, more inclusive facilities and policies, and stronger anti-discrimination mechanisms. Significantly, the model's students-as-experts approach helped to rebalance traditional power dynamics, fostering an environment of mutual respect and shared responsibility. This work highlights the role of co-created, culturally sensitive pedagogies in advancing professional identity formation and offers a replicable model for other minority student groups.

Emerging insights

Professionalism in health professions education is co-constructed emerging through interactions between individuals, institutions, and the sociocultural landscapes they inhabit. It is shaped not only by what is explicitly taught but also by the emotional labor of care, the subtle messages embedded in institutional culture, and the capacity of learners and educators to navigate complexity with integrity. The insights gathered across this Research Topic illuminate how empowerment, psychological resilience, and reflective engagement foster the internalization of professional values. They expose how hidden curricula, linguistic diversity, and culturally laden assessment practices influence the lived experience of becoming a professional. Importantly, these works challenge narrow or prescriptive approaches to teaching professionalism, advocating instead for pedagogies that are attentive to context, sustained over time, and open to student and faculty agency. What emerges is a call for professionalism education that is dialogic, responsive, and anchored in ethical intentionality one that embraces uncertainty, cultivates critical thinking, and reimagines what it means to act professionally in a pluralistic and evolving healthcare world.

Conclusion

Taken together, these nine contributions challenge us to rethink medical professionalism as a culturally situated, psychologically influenced, and institutionally embedded construct. From empowering nurses to supporting student mental health, from assessing fairly to recognizing hidden curricula, professionalism emerges as a multifaceted endeavor. As editors, educators, and practitioners, we are called not just to define professionalism but to ensure its teaching and assessment are inclusive, sustainable, and context-sensitive. We hope this Research Topic inspires continued innovation and global dialogue in the service of a more human-centered, culturally attuned medical education.

Author contributions

KS: Writing – original draft, Formal analysis, Project administration, Validation, Conceptualization, Data curation, Writing – review & editing, Supervision. KO: Writing – original draft, Writing – review & editing. BV: Writing – review & editing, Writing – original draft.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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EDITED BY
Kamran Sattar,
King Saud University, Saudi Arabia

REVIEWED BY
Mansoor Malik,
Johns Hopkins Medicine, United States
Zhen Yan,
Universiti Putra Malaysia Bintulu Sarawak Campus, Malaysia

*CORRESPONDENCE
Rabia S. Allari
✉ R.allari@ammanu.edu.jo

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The psychological empowerment and quality of work life among Jordanian primary care nurses and midwives

Asem Mohammad Al-Obiedat[1,2], Rabia S. Allari[1]* and Muntaha K. Gharaibeh[1,3]

[1]Faculty of Nursing/ Al-Ahliyya Amman University, Amman, Jordan, [2]King Hussein Medical Center in Royal Medical Services, Amman, Jordan, [3]Jordan University of Science and Technology, Faculty of Nursing/MCH Department, Irbid, Jordan

Introduction: The healthcare industry, particularly in the context of primary care, presents various challenges to nurses and midwives, influencing their psychological empowerment (PE) and quality of work life (QWL).

Objective: This study's objective is to assess the levels of PE and QWL among Jordanian primary care nurses and midwives and explore the relationship between PE and QWL.

Methods: Utilizing a descriptive correlational design, the study included 273 Jordanian primary care nurses and midwives through convenience sampling. The Psychological Empowerment Instrument and Brook's Quality of Nursing Work Life Survey were used to measure PE and QWL. Data was analyzed using descriptive statistics to describe the study participant's characteristics and inferential analysis such as Pearson correlation, and multiple regression to examine relationships and identify predictors of study variables.

Results: The study found that the QWL scale had high reliability (Cronbach's alpha = 0.954), and similarly, the PE scale demonstrated strong reliability (Cronbach's alpha = 0.948). Moving on to the core findings, significant positive correlations were identified between PE and QWL, with a correlation coefficient of $r = 0.568$ ($p < 0.01$), indicating that higher levels of psychological empowerment were associated with better quality of work life. Furthermore, the regression analysis revealed that PE accounted for approximately 32.3% of the variability in QWL scores. Interestingly, participants holding diplomas reported the highest QWL scores (mean = 136.14), while those contemplating leaving the nursing profession displayed significantly lower QWL scores (mean = 114.14). No significant correlations were found between PE and sociodemographic variables such as age, income, and years of experience.

Conclusion: This study reveals a crucial need to enhance PE and QWL. Key findings show moderate PE and QWL levels, with variations based on educational background and workplace. The positive correlation between PE and QWL identifies the benefits of fostering empowerment through professional development, job autonomy, and decision-making. These insights are vital for improving nursing practice and policy and enhancing nurse satisfaction and patient care.

KEYWORDS

Jordan, midwives, nurses, primary care, psychological empowerment, quality of work life, UN sustainability goals

1 Introduction

Quality of Work Life (QWL) is defined as the degree to which registered nurses can satisfy important personal needs through their experiences in their work organization while achieving the organization's goals (1). Quality of work life is a multifaceted variable that depicts a worker's views about several elements of his or her job (2). Employee satisfaction, conditions of employment, appropriate and fair compensation, job advancements, work versatility, participation in decision-making tasks, occupational health and safety, workplace stress, organizational stability in employment and personal connections, and work-life continuity are examples of factors influencing workplace well-being (3, 4).

The QWL in nursing is characterized by the degree to which nursing staff may address essential individual requirements via their career experience while still achieving the organization's mission (2). As a result of a high level of QWL, employees will feel satisfaction (5). Also, it gives people areas where they may feel relaxed, respected, and at ease (2). It has been shown that QWL impacts employee productivity in several contexts, particularly in healthcare institutions (6, 94); high QWL is necessary to attract new personnel and retain current ones (2). Therefore, greater organizational dedication and job satisfaction, effective healthcare quality, better individual and organizational productivity, lower fatigue, and individual and institutional attrition are among the potential advantages of high-level QWL (7, 92, 102).

Nurses' QWL may fluctuate from poor to acceptable between countries (8). Akter et al. (9) reported that nurses in Bangladesh evaluated the QWL as average while 52.4% of primary health care nurses in Saudi Arabia were dissatisfied with their QWL (10), between 70.8 and 81.2% of Iranian nurses, had poor QWL (11) which was almost similar to that of Ethiopian nurses who reported that 67.2% of nurses were unsatisfied with their QWL (12). Furthermore, the setting seemed to influence the QWL; Iran and Taiwan nurses serving in outpatient units had higher QWL than staff nurses in other units (2). These differences might be attributed to the fact that inpatient nurses often work in shifts involved with direct patient care with high time constraints, job pressure, and environmental concerns, all of which lead to lower QWL (12).

Studies on QWL have identified numerous variables that affect nurses' QWL (2, 13). One of these issues was the mismatch between work and personal life (13, 93). The top reasons for poor QWL were stressful work hours, suboptimal staffing, a loss of decision-making, handling activities irrelevant to nursing, a shortage of professional growth opportunities, an unpleasant workplace environment, and inadequate remuneration (2). Apart from these issues, management practices, interactions with coworkers, opportunities for professional growth, and work conditions all impact nurses' QWL in the workplace (14, 100).

Another study by Yan et al. (15) highlighted that due to irregular working schedules and psychological stress, the study's participants had to encounter work–family conflicts, which negatively influenced job performance. Prior studies in Saudi Arabia found that long working hours, incapability to manage work and family requirements, insufficient break duration, poor salaries, delay in career progression, and insufficient hospital-promoted coaching were major significant determinants for nurses' discontentment with QWL (16). In Jordan, the study of Salahat and Al-Hamdan (17) found that most participating Jordanian nurses in the study were moderately satisfied with their QWL, and QWL was correlated positively with job satisfaction and negatively with intent to leave their job (17).

It is central to ensure the well-being of primary healthcare providers, including public health administrators, physicians, dentists, registered nurses, and midwives. These professionals should receive adequate training and be provided with the necessary biopsychosocial arrangements, as well as psychological empowerment, to effectively carry out their duties (18). Places of employment must be appealing and compassionate, and healthcare workers must be well rewarded (18, 109). Yet nurses working in primary health care are facing several stressful and unsatisfactory working circumstances (19). Nurses, for example, frequently need to pay closer attention to their health issues (2). Primary healthcare institutions are high-stress situations for both healthcare staff and patients (20). There is a constant flow of new and diverse health issues that are challenging to treat in this situation (2). These challenges require accepting responsibility for clients' healthcare over time and caring for their diverse needs and requirements, which puts massive effort and pressure on healthcare employees, particularly nurses (20).

Psychological Empowerment (PE) refers to a psychological state in the workplace where individuals feel a sense of control, autonomy, and motivation, which enables them to engage fully in their tasks and contribute positively to their organization (21). It encompasses four key dimensions: competence, meaning, self-determination, and impact. For nurses specifically, PE takes on a distinctive meaning, embodying their ability to provide competent and compassionate patient care, find profound meaning in their role as caregivers, exercise autonomy in clinical decision-making, and understand the significant impact of their actions on patient well-being and healthcare quality. Within this context, PE becomes a driving force that motivates nurses to deliver the highest standard of care and fosters their commitment to the well-being of their patients and the healthcare system.

Studies have shown that PE has a significant role in improving nurses' job motivation and occupational mental health (22). Higher levels of workplace empowerment were correlated with higher levels of work motivation and lower levels of occupational stress among nurses (23). PE entails emotions that indicate how much workers appreciate and contribute to the company (24, 95). Monje-Amor et al. (25) study approved that structural and psychological empowerment are critical antecedents of work engagement among employees working in Spain and the UK. Psychological empowerment may also be characterized as a process that commences with the idea that positive changes are occurring around the individual and subjectively alters employees' perceptions of actively participating in accomplishing work-related activities with full endeavors (26). PE has four aspects: competence (the inner emotions that staff members have to do their job well); meaning (the extent to which individuals value their job"); self-determination (the extent to which staff members have control

over their jobs and are allowed to select how to carry out their tasks); and impact (the extent to which staff feels they can affect their place of work) (27, 99).

Poor PE in the workplace can result in disengagement, increased stress, and reduced job satisfaction (98). A study by Jahangirian et al. (109) found that low PE was negatively correlated with the QWL among healthcare professionals, highlighting the importance of improving PE to enhance QWL and overall workplace outcomes.

Primary health care (PHC) in Jordan is provided through a network of facilities managed by the Ministry of Health (MOH). Primary health care facilities are separated into three types, Village clinics (VC), Primary Healthcare Centers (PHCs), and Comprehensive Health Centers (CHCs) (28).

The PHC provides midwifery, nursing care, and healthcare for mothers and children. In addition to general practice, a physician, and a secretary for handling administration tasks, including keeping patient-based manual medical records are also available. Primary health care's primary responsibilities include immunizations, dentist-provided dental treatment, and a pharmacy, which supplies the most important drugs. The CHC is a state-of-the-art healthcare facility that employs a diverse team of medical professionals, including doctors, nurses (including midwives), and administrative personnel specializing in secretarial and accounting tasks. The facility has a manual record-keeping system that is organized by the family. In addition to family practice and general medicine, the CHC offers emergency treatment, which includes specialized and minor surgical services provided by MOH specialists. These experts are either permanently stationed at the center or rotate regularly. The primary areas of emphasis are immunizations, oral health treatment, medication prescriptions, laboratory services, and radiological procedures (29, 30). Jordan has 365 primary health facilities, 184 VHCs, and 122 CHCs as of 2022 (28). The Jordanian government has made universal health coverage (UHC) a strategic goal and has given it top priority in plans and initiatives. Three goals must be achieved for UHC to be realized: providing high-quality healthcare; reducing financial obstacles to healthcare access; and guaranteeing that everyone, even the most vulnerable and poor patients, has access to treatment (31). But Jordan is not at UHC yet, since several issues impact the PHC and the healthcare system. These difficulties include the changing demographics and population increase, the rising cost of treating non-communicable diseases, and the tightening of financial conditions (32).

Primary care is associated with various unpleasant and unsatisfactory work environments such as stress for workers in several professional categories, particularly nurses (19, 33). Such an environment may demonstrate that nurses who work in such extreme situations will develop low levels of QWL. The top causes of low QWL identified were stressful work schedules, staffing shortages, a manqué of autonomy in decision-making, doing jobs irrelevant to nursing, a lack of professional growth opportunities, unsuitable work conditions, inadequate wages, inadequate work hours, difficulty reconciling work with family requirements, inadequate break time, delay in promotion, and inadequate hospital-sponsored training (34, 35). After reviewing the literature, it was determined that greater attention should be devoted to the understudied issue of primary care nurses, and few studies assessed the levels of QWL among Jordanian primary care nurses. Healthcare workers, particularly community health workers, physicians, dentists, nurses, and midwives, must be cared for because individuals in these professions must be well-trained and provided with proper biopsychosocial support, and PE, to function effectively (36). Workplaces must be engaging and compassionate, and healthcare workers must be appropriately compensated (37).

Previous studies have underscored the significant role of PE in enhancing nurses' work motivation and occupational mental health (38), with positive correlations between PE and QWL well-established in the literature. For instance, a study by Karimi et al. (97) and Jahangirian et al. (109) found a notable positive association between PE and QWL among healthcare professionals. Furthermore, it is essential to recognize that PE is not just a general concept; it has practical implications for patient care quality. Nurses who experience higher levels of PE are more likely to deliver patient-centered, high-quality care, which benefits patient outcomes (21). Nationally and regionally, many previous studies highlighted the determinants of PE among nurses, and the major factors that may influence PE were work engagement, and job security (39), feeling competence (40), management commitment (41), and Job satisfaction (42).

Enhancing the QWL is a comprehensive method to raise the QWL of workers, and every organization must acquire and retain employees (43). A strong QWL is critical for healthcare institutions to have competent, devoted, and engaged employees (110). Service provision in healthcare organizations relies on their staffing competence and skills (44). Among the several specializations in healthcare settings, nurses have a larger, more significant, and improving their QWL has emerged as a pressing issue in the healthcare industry (111). Despite the recognized importance of PE in boosting nurses' work motivation and occupational mental health and the well-established positive correlations between PE and QWL in the existing literature, there remains a notable knowledge gap. This gap primarily pertains to the limited focus on primary care nurses specifically. While studies have explored these relationships in the broader healthcare context, there is a scarcity of research that delves into the unique challenges and dynamics faced by nurses working in primary care settings. Given primary care nurses' distinctive demands and responsibilities, further investigation into the correlation between PE and QWL within this context is essential to provide tailored insights and strategies. Understanding this relationship among primary care nurses is crucial for addressing their specific needs and reducing intentions to leave the profession, encouraging the quality of care, and sustaining the nursing workforce in primary care settings. Closing this knowledge gap can contribute significantly to the overall well-being of primary care nurses and the healthcare system. Lastly, this study will be the first of its kind to measure Jordanian nurses' QWL, which will aid in setting proper strategies to enhance the approach of PE. In addition, this study targets the most important priorities of sustainable development topics related to human resources development and the promotion of their integration and belonging in the workplace, thus improving productivity and effectiveness at work. In addition, the QWL is one of the most important aspects of sustainable development (45).

1.1 Purposes of the study

This study aims to assess the levels of PE and QWL among Jordanian primary care nurses and midwives and explore the relationship between PE and QWL.

1.2 Research questions

1 What is the level of PE and QWL of Jordanian primary care nurses and midwives?
2 Is there a relationship between PE, QWL and sociodemographic variables of Jordanian primary care nurses and midwives?
3 Are there differences in levels of QWL among Jordanian primary care nurses and midwives based on their selected sociodemographic variables?
4 What are the predictors of QWL of Jordanian primary care nurses?

2 Methodology

2.1 Design

The study used a descriptive cross-sectional correlational design, which is suitable for understanding how different variables relate to each other over a specific time frame. This design was chosen because it allows for a quick and straightforward way to identify connections and predict how one variable might influence another in the research (46).

2.2 Settings

The study took place in healthcare centers from governmental sectors in the central region of Jordan (Amman, Alzarqa, Madaba, and Albalqa). The total number of comprehensive primary health care centers in the central region, according to the MOH (28) statistics, is 41 centers. Ten healthcare centers were conveniently chosen. The selected primary healthcare centers provide comprehensive services for a wide range of the population across different age categories.

2.3 Population and sample

A convenient sampling method was used to select participants. The accessible population was all Jordanian primary care nurses and midwives working in selected governmental comprehensive primary care centers. The selection of this particular approach is based on its practicality, cost-effectiveness, and efficiency in targeting a certain subgroup of the population, namely primary healthcare nurses and midwives. Convenience sampling allows for the efficient collection of data from persons who are readily available and fulfill particular criteria for inclusion (47). The sample size was calculated using the G*Power 3.1.10 program. Using the regression test, the minimum required sample size was 178 (power = 0.95, $\alpha = 0.05$, and medium effect size = 0.15 with 11 predictors). Also, 20% was added to avoid incomplete questionnaires and participants' withdrawal. Therefore, the minimal assumed sample size required was 213. The inclusion criteria for the sample selection include only nurses and midwives who (a) are full-time employees, (b) are employed for a minimum of 6 months, and are involved in direct client care. Those on leave during the study period and nurse managers were excluded from the study. Although this study is descriptive, confounders were managed through inclusion criteria: participants must be currently employed at PHC centers at the time of the data collection to capture the insights of current practices and challenges in primary healthcare settings; with a minimum of 6 months of experience to ensures participants have substantial exposure to the primary healthcare environment, making their contributions to understanding the quality of work life and psychological empowerment more valuable. In addition, the researcher made sure that the sample had the sufficient number of nurses and midwives for measuring differences from different PHCs in the central region of Amman with diverse sociodemographic characteristics.

2.4 Study instruments

A self-reported paper-based questionnaire was distributed to nurses and midwives. The survey package consisted of three sections: the sociodemographic part, the PE instrument, and Brook's Quality of Nursing Work Life Survey.

Sociodemographic Questions. It includes age, gender, marital status, monthly income, educational level, job title, years of experience, weekly working hours, overtime, an intention to leave the current workplace, and intention to leave the nursing career.

Psychological Empowerment Instrument: The original instrument was developed by Spreitzer (21) to assess nurses' psychological empowerment. The scale is composed of 12 items equally distributed in four sub-dimensions (meaning, competence, self-determination, and impact). The mean of the four sub-dimensions was used to create an overall empowerment score. Responses to each statement are rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The overall total score ranges from 12 to 60, and the subscale total score ranges from 3 to 15, where a higher score means a higher level of psychological empowerment. The PE instrument reported good validity and reliability (21, 48, 49), and the internal consistency reliability of the original scale using Cronbach's α was 0.80 (21, 48). The PE 5 points Likert scale (49) was originally developed in English and was translated to Arabic by Malak and Abu Safieh (50), who concluded that the tool is valid after testing for face validity and showed Cronbach's alpha for internal consistency of 0.87, and this Arabic version was adopted in this study after guaranteeing permission of the authors.

Brook's Quality of Nursing Work-Life Survey (BQNWLS): The scale was originally developed in the English language by Brooks (51) to measure nurses' work-life quality. The BQNWLS is a 42-item scale that enables respondents to rate their level of agreement or disagreement on a six-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). The overall score for the BQNWLS is calculated by summing the values of all 42 questions, and it ranges from 42 to 252, with a higher number reflecting superior QWL. The internal consistency coefficient of the original BQNWL scale was 0.89 (51). The BQNWL was translated for this study into Arabic (108). A pilot study was conducted on a sample of 30 primary care nurses from different centers The BQNWL scale demonstrated a high internal consistency with a Cronbach's alpha coefficient of 0.95, indicating a reliable measurement instrument.

2.5 Ethical considerations

Approval of the study was obtained from the institutional review board (IRB) of where the researchers work No. (MOH\REC\2023\98).

Nurses and midwives were informed that participation in this study is voluntary and no penalties for non-participation. They were also assured that they had the right not to answer the question they chose. Participants were instructed that completing and returning the questionnaire would be considered as written consent for participation. The cover letter attached to each questionnaire included an explanation about the research purpose and assured them of the confidentiality of the obtained information, which will be used by the researcher only, and no risks are associated with the completion of the survey. The permission of the authors of the translated instruments was obtained prior to the data collection process. The collected data was saved on the investigator's password-protected personal computer. All processes in this study adhere to the institutional research committee's ethical guidelines as well as the 1964 Helsinki Declaration and its subsequent revisions or similar ethical standards (52).

2.6 Data collection process

The data collection process lasted for 6 weeks from Feb to mid-April 2023. The managers of the ten selected healthcare centers were approached by the researcher who explained the study's purpose and asked for their support in the data collection process. The researcher and the manager verified the number of nurses and midwives in each selected center. The researcher then approached nurses and midwives in their workplaces and distributed the questionnaire to those who met the criteria. The questionnaire, accompanied by an envelope and a cover letter was distributed by the primary researcher to all nurses in each center after they agreed to participate. Nurses and midwives were asked to complete the questionnaire, put it in a sealed envelope, and return it to a box that was designated for the completed one.

The investigator personally collected the sealed envelopes every 3 days until the end of the data collection time. A code, known only to the investigator, was placed on each completed envelope in the top right corner of the front sheet to note the center. To maintain strict confidentiality of responses, the codes were removed from the questionnaires when the analysis was completed. A total of 320 envelopes were distributed to the ten sites, and 290 questionnaires were returned to the boxes in the 10 centers giving a response rate of 90.6%.

2.7 Data analysis

The IBM SPSS version 22 was used to analyze data from the 290 participants. Data was cleaned and checked for any missing information or outliers. Descriptive statistics are used to describe and analyze a dataset's main features and characteristics without making any generalizations or inferences to a larger population. Descriptive statistics of the participant's demographic data were computed using central tendency and dispersion measures. Continuous variables like levels of perceived PE and QWL were measured using Mean (M) and Standard deviation (SD) for each item and total scale items, and frequency for categorical variables. Subscales' means were calculated. Relationships between PE, participants' sociodemographic characteristics, and QWL were tested using the Pearson correlation test (r) (46). The differences in averages of QWL were examined via t-test and one-way ANOVA. ANOVA is a versatile and powerful statistical technique and an essential tool when researching multiple groups or categories. The one-way ANOVA can help you know whether or not there are significant differences between the means of your independent variable, and the t-test is an inferential statistic used to determine if there is a significant difference between the means of two groups and how they are related (46). Also, A *post hoc* analysis was conducted to determine the group comparisons. Multiple linear regression was utilized to identify predictors of QWL. The p-value <0.05 was considered statistically significant.

3 Results

3.1 Demographic descriptive statistics

The mean age of the participants was 33.30 years (SD = 7.31), The participants' monthly incomes mean is 526.28 dinars (SD = 146.11). The participants had varying levels of experience in the nursing profession, with an average of 11.75 years (SD = 7.11). Similarly, the years of employment in the current health center mean is 5.99 years (SD = 5.30) as indicated in Table 1.

On average, the participants reported working 42.01 h per week (SD = 7.35), with weekly working hours ranging from 36 to 72.00 h. In terms of gender distribution, 53 participants (19.4%) were male, while the majority, 220 participants (80.6%), were female. 106 participants (38.8%) held a diploma, 132 participants (48.4%) had a bachelor's degree, and 35 participants (12.8%) had a postgraduate degree. Among the participants, the majority, 232 individuals (85.0%), held the job title of registered nurse, while 41 individuals (15.0%) were midwives. A total of 39 participants (14.3%) reported working overtime, while the remaining 234 participants (85.7%) did not engage in overtime work.

When it comes to their intentions, 53 participants (19.4%) expressed an intention to leave their current workplace, while 220 participants (80.6%) reported no such intention. Among those with an intention to leave, the most cited reason was inconvenient working conditions, mentioned by 140 individuals (51.3%). In comparison, 133 individuals (48.7%) expressed that the lack of professional development opportunities was a contributing factor. Additionally, 49 participants (17.9%) indicated an intention to leave the nursing career, while the majority, 224 participants (82.1%), expressed no such intention.

3.2 The levels of PE and QWL of Jordanian primary care nurses and midwives

Table 2 provides descriptive statistics for the PE scale and its subscales among the same participants. The PE total scale scores ranged from 12.00 to 60.00, with a mean score of 43.01 (SD = 12.03). On the PE meaning subscale, scores ranged from 3.00 to 15.00, with a mean score of 10.80 (SD = 3.22). For the PE competence subscale, scores ranged from 3.00 to 15.00, with a mean score of 11.17 (SD = 3.20). The PE self-determination subscale had scores ranging from 3.00 to 15.00, with a mean score of 10.35 (SD = 3.37). Lastly, on the PE self-impact subscale, scores ranged from 3.00 to 15.00, with a mean score of 10.68 (SD = 3.16).

TABLE 1 Demographic and work-related characteristics of participants ($N = 273$).

Variable	Minimum	Maximum	*M*	SD
Age	20.00	57.00	33.30	7.31
Monthly income in Jordanian dinars	200.00	1100.00	526.28	146.11
Years of experience	1.00	36.00	11.75	7.11
Years of employment in the current health center	1.00	29.00	5.99	5.30
Weekly working hours	36	72.00	42.01	7.35
Variable			F	%
Gender				
Male			53	19.4
Female			220	80.6
Marital status				
Single			68	24.9
Married			197	72.2
Others			8	3.0
Educational level				
Diploma			106	38.8
Bachelor			132	48.4
Postgrad			35	12.8
Job title				
Registered nurse			232	85.0
Midwife			41	15.0
Over time				
Yes			39	14.3
No			234	85.7
Intention to leave current workplace				
Yes			53	19.4
No			220	80.6
Reasons for Intention to leave current workplace				
Inconvenient working condition			140	51.3
For professional development opportunities			133	48.7
Intention to leave nursing career				
Yes			49	17.9
No			224	82.1
Reasons for intention to leave nursing career				
Work-related Challenges			182	66.7
Financial and Social Factors			91	33.3

M, mean; SD, standard deviation; F, frequency; %, percentage.

Table 3 presents descriptive statistics for items on the PE scale. The top-rated item, on average, was "I am confident in my ability to do my job," with a mean score of 3.75. Following closely is the statement, "The work I do is important to me," with a mean score of 3.6557. "I have significant autonomy in determining how I do my job" also received a high mean score of 3.52. "My impact on what happens in my department is large" and "My job activities are personally meaningful to me" received mean scores of 3.53 and 3.47, respectively. Conversely, the lowest-rated item on the scale is "I can decide on my own how to go about doing my own work," with a mean score of 3.4103. "I have considerable opportunity for independence and freedom in how I do my job" received a slightly higher mean score of 3.42 but still falls among the lower-rated items.

Table 4 presents the descriptive statistics for the BQNWL scale and its subscales among the participants ($N = 273$). The BQNWL total score ranged from 45.00 to 205.00, with a mean score of 130.92 (SD = 30.19). The participants' scores on the BQNWL Work Life subscale ranged from 7.00 to 30.00, with a mean score of 17.85 (SD = 5.56). For the QWL Work Design subscale, the scores ranged from 12.00 to 50.00, with a mean score of 33.06 (SD = 7.66). The BQNWL Work Context subscale

TABLE 2 Descriptive statistics for PE scales and subscales ($N = 273$).

Variable	Min	Max	Mean	Std. Deviation
PE total scale	12.00	60.00	43.01	12.03
PE: meaning subscale	3.00	15.00	10.80	3.22
PE: competence subscale	3.00	15.00	11.17	3.20
PE: self-determination subscale	3.00	15.00	10.35	3.37
PE: self-impact subscale	3.00	15.00	10.68	3.16

PE, psychological empowerment.

TABLE 3 Psychological empowerment items ($N = 273$).

Items	Minimum	Maximum	Mean	Std. Deviation
I am confident in my ability to do my job	1.00	5.00	3.78	1.38
The work I do is important to me	1.00	5.00	3.65	1.31
I have significant autonomy in determining how I do my job	1.00	5.00	3.52	1.25
My impact on what happens in my department is large	1.00	5.00	3.53	1.23
My job activities are personally meaningful to me	1.00	5.00	3.47	1.20
I have a great deal of control over what happens in my department	1.00	5.00	3.50	1.22
I can decide on my own how to go about doing my own work	1.00	5.00	3.43	1.30
I have considerable opportunity for independence e and freedom in how I do my job	1.00	5.00	3.42	1.32
I have mastered the skills necessary for my job	1.00	5.00	3.72	1.19
The work I do is meaningful to me	1.00	5.00	3.67	1.20
I have significant influence over what happens in my department	1.00	5.00	3.64	1.21
I am self-assured about my capabilities to perform my work activities	1.00	5.00	3.65	1.20

TABLE 4 Descriptive statistics for BQNWL scale and subscales ($N = 273$).

Variable	Min	Max	Mean	Std. Deviation
BQNWL total score	45.00	205.00	130.92	30.19
BQNWL Work Life subscale	7.00	30.00	17.85	5.56
BQNWL work design subscale	12.00	50.00	33.06	7.66
BQNWL Work Context subscale	19.00	95.00	62.30	15.40
BQNWL Work World subscale	5.00	25.00	14.86	4.51

BQNWL, Brooks Quality of Nurse Work life.

had scores ranging from 19.00 to 95.00, with a mean score of 62.30 (SD = 15.40). Finally, on the BQNWL Work World subscale, scores ranged from 5.00 to 25.00, with a mean score of 14.86 (SD = 4.51).

The highest-ranked items in the BQNWL scale reveal significant insights into the aspects of the work environment that healthcare professionals value the most. Notably, respondents gave the highest mean score to the statement "I feel like there is teamwork in my work setting" (Mean = 3.43). This result underscores the importance of teamwork in healthcare, indicating that employees perceive a strong sense of collaboration and mutual support among their colleagues. Additionally, "Friendships with my co-workers are important to me" and "I feel like I belong to the 'work family'"received identical mean scores of 3.52. Finally, "I am able to communicate with other therapists" garnered a mean score of 3.66, indicating that healthcare professionals believe in effective communication with their peers in related fields, which is essential for delivering coordinated and high-quality patient care. These findings highlight the significance of positive interpersonal relationships, teamwork, and effective communication as crucial components of a satisfying and fulfilling work environment in the healthcare sector (Table 5).

On the contrary, the lowest-ranked items in the BQNWL scale shed light on areas of concern and dissatisfaction among healthcare professionals. Notably, the statement "My salary is adequate for my job given the current job market conditions" received the lowest mean score (Mean = 2.54). This result suggests that, on average, respondents do not feel that their salaries are commensurate with the demands of their positions, considering the current job market conditions. This financial concern can contribute to stress and job dissatisfaction among healthcare workers. Similarly, "I believe that, in general, society has the correct image of nurses" received a relatively low mean score of 2.68, indicating that respondents, on average, do not believe that society holds an accurate or favorable perception of the nursing profession. This perception could potentially affect morale and job satisfaction, as it reflects concerns about the recognition and

TABLE 5 Items for the BQNWL scale ($N = 273$).

	Mean	Std. Deviation
I am able to balance work with my family needs	3.22	1.25
I am able to arrange for child-care when I am at work	2.95	1.24
I have energy left after work	2.86	1.27
My organization's policy for family-leave time is adequate	2.94	1.27
I am able to arrange for day care for my elderly parents	2.86	1.23
I am able to arrange for day care when my child is ill	2.97	1.21
I receive a sufficient amount of assistance from unlicensed support personnel	3.30	1.20
I am satisfied with my job	3.41	1.18
My workload is too heavy	3.23	1.27
I have autonomy to make patient care decisions	3.37	1.21
I perform many non-nursing tasks	3.31	1.27
I experience many interruptions in my daily work routine	3.25	1.19
I have enough time to do my job well	3.19	1.27
There are enough RNs in my work setting	3.03	1.32
I am able to provide good quality patient care	3.60	1.2
I receive quality assistance from unlicensed support personnel	3.33	1.27
I am able to communicate well with my nurse manager/supervisor	3.35	1.22
I have adequate patient care supplies and equipment	3.20	1.26
My nurse manager/supervisor provides adequate supervision	3.35	1.20
Friendships with my co-workers are important to me	3.52	1.15
My work setting provides career advancement opportunities	3.29	1.25
I feel like there is teamwork in my work setting	3.43	1.18
I feel like I belong to the "work family	3.52	1.15
I am able to communicate with other therapists (physical, respiratory, etc.)	3.66	1.06
I receive feedback on my performance from my nurse manager/supervisor	3.35	1.18
I am able to participate in decisions made by my nurse manager/supervisor	3.35	1.17
I feel respected by physicians in my work setting	3.57	1.16
The nurses' lounge/break-area/locker room in my setting is comfortable	2.84	1.34
I have access to degree completion programs through my work setting	2.85	1.30
I receive support to attend in-services and continuing education programs	3.10	1.32
I communicate well with the physicians in my work setting	3.42	1.22
I am recognized for my accomplishments by my nurse manager/supervisor	3.19	1.19
Nursing policies and procedures facilitate my work	3.23	1.19
I feel the security department provides a secure environment	3.05	1.25
I feel safe from personal harm (physical, emotional, or verbal) at work	3.01	1.31
I feel that upper-level management has respect for nursing	2.78	1.32
I believe that, in general, society has the correct image of nurses	2.68	1.29
My salary is adequate for my job given the current job market conditions	2.54	1.32
I would be able to find the same job in another organization with about the same salary and benefits	3.05	1.23
I feel my job is secure	3.26	1.22
I believe my work impacts the lives of patients/families	3.31	1.33

appreciation of nursing in the broader community. Additionally, "I feel that upper-level management has respect for nursing" garnered a mean score of 2.78. Moreover, "The nurses' lounge/break-area/locker room in my setting is comfortable" and "I have access to degree completion programs through my work setting" received mean scores of 2.84 and 2.85, respectively, indicating that respondents are dissatisfied with the comfort of their physical workspaces and the availability of educational opportunities through their workplaces.

TABLE 6 The relationship between PE and QWL among Jordanian primary care nurses and midwives ($N = 273$).

Variable		QWL total score	QWL work life subscale	QWL work design subscale	QWL work context subscale	QWL work world subscale
P.E total score	Pearson Correlation	0.568**	0.510**	0.628**	0.497**	0.361**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
P.E meaning subscale	Pearson Correlation	0.520**	0.467**	0.569**	0.465**	0.311**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
P.E competence subscale	Pearson Correlation	0.568**	0.497**	0.640**	0.498**	0.357**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
P.E self-determination subscale	Pearson Correlation	0.535**	0.516**	0.584**	0.451**	0.351**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
P E self-impact subscale	Pearson Correlation	0.487**	0.411**	0.538**	0.432**	0.322**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000

r, Pearson correlation coefficient; P, Significance.
**Correlation is significant at the 0.01 level.

These factors contribute to the overall work environment and can impact on job satisfaction and well-being.

3.3 The relationship between PE, QWL, and sociodemographic variables of Jordanian primary care nurses and midwives

A significant positive moderate correlation was observed between PE and the BQNWL total score (r (271) = 0.568, $p < 0.01$) as indicated in Table 6, highlighting the robust connection between psychological empowerment and the overall quality of work life in this healthcare setting. Specifically, the BQNWL Work Design subscale exhibited the strongest positive correlation with the PE total score (r (271) = 0.628, $p < 0.01$), underscoring the crucial role of work task and responsibility design in influencing nurses' psychological empowerment. Additionally, the BQNWL Work Life subscale (r (271) = 0.510, $p < 0.01$) emphasized the significance of work-life balance with psychological empowerment, while the BQNWL Work Context subscale (r (271) = 0.497, $p < 0.01$) highlighted the impact of the work environment on nurses' empowerment.

The correlation analysis between selected demographic variables with the QWL and PE total score ($N = 273$) revealed that age, monthly income in Jordanian dinars, years of experience, and years of employment in the current health center did not show significant correlations with the QWL or PE total score. The correlations were all non-significant ($p > 0.05$), suggesting that these demographic factors did not have a notable relationship with the level of PE among Jordanian primary care nurses and midwives in this study.

3.4 The differences in levels of QWL among Jordanian primary care nurses and midwives based on their selected sociodemographic variables

Table 7 presents the variations in QWL levels based on selected demographic characteristics of Jordanian primary care nurses and midwives ($N = 273$). For the variable "Educational level," the mean QWL scores differed significantly among the groups ($p = 0.02$). Participants with a diploma had the highest mean QWL score (136.14), followed by those with a postgraduate degree (134.91), and those with a bachelor's degree (125.67). No significant differences in QWL scores were found based on gender ($p = 0.23$), marital status ($p = 0.65$), specialty ($p = 0.18$), or overtime work ($p = 0.09$).

However, significant differences in QWL scores were observed for the variable "Intention to leave current workplace" ($p = 0.02$). Participants intending to leave their current workplace had a lower mean QWL score (122.05) compared to those who did not express such intention (133.05). Significant differences in QWL scores were also found for the variable "Intention to leave nursing profession" ($p = 0.000$). Participants with an intention to leave the nursing profession had a significantly lower mean QWL score (114.14) compared to those who did not have such an intention (134.59). No significant differences in QWL scores were observed based on the reasons for intention to leave the workplace ($p = 0.97$) or the reasons for intention to leave the nursing profession ($p = 0.96$).

Post hoc test results in Table 8 showed that nurses and midwives with a diploma had significantly higher QWL scores compared to those with a bachelor's degree (mean difference: 10.46, $p = 0.015$), and those with a postgraduate degree showed significantly higher scores than bachelor's degree holders (mean difference: 9.24, $p = 0.025$). Regarding the intention to leave the current workplace, those without the intention had significantly higher QWL scores than those intending to leave (mean difference: 11.01, $p = 0.021$). Similarly, for the intention to leave the nursing profession, both nurses and midwives without such intention had significantly higher QWL scores than those with the intention (mean differences: 20.45 for nursing, 17.63 for midwives, $p < 0.05$ in both cases).

3.5 Predictors of QWL among Jordanian primary care nurses and midwives

The multiple linear regression analysis was conducted to examine the predictors of QWL among Jordanian primary care nurses and

TABLE 7 Variations in QWL levels based on selected demographic characteristics of Jordanian primary care nurses and midwives ($N = 273$).

Variable	*N*	Mean	Sig
Educational level			0.020
Diploma	106	136.14	
Bachelor	132	125.67	
Postgraduate	35	134.91	
Gender			0.233
Male	53	135.56	
Female	220	129.80	
Marital status			0.653
Single	72	129.50	
Married	201	131.43	
Specialty			0.185
Nursing	232	129.82	
Midwives	41	137.17	
Over time			0.095
Yes	39	139.07	
No	234	129.56	
Intention to leave the current workplace			0.021
Yes	53	122.05	
No	220	133.05	
Reasons for intention to leave the workplace			0.974
Inconvenient working condition	140	130.86	
For professional development opportunities	133	130.98	
Intention to leave the nursing profession			0.000
Yes	49	114.14	
No	224	134.59	
Reasons for intention to leave the nursing profession			0.967
Work-related Challenges	182	130.97	
Financial and Social Factors	91	130.81	

midwives. The overall model summary indicates that the single predictor variable, "PE total score," accounts for a significant proportion of the variance in QWL (R Square = 0.32). The adjusted R Square value, which takes into consideration the number of predictors in the model, is 0.32. This suggests that approximately 32.3% of the variability in QWL scores can be explained by the "PE total score."

The standard error of the estimate is 24.8, reflecting the average difference between the observed and predicted QWL scores. The F-statistic of 129.3 is highly significant ($p < 0.001$), indicating that the model is a good fit for the data. The Durbin-Watson statistic of 1.75 falls within the acceptable range, suggesting that there is no significant autocorrelation in the residuals.

In terms of the individual predictor variable, the unstandardized coefficient for "PE total score" is 1.42 (SE = 0.12), indicating the estimated increase in QWL score associated with a one-unit increase in the "PE total score." The standardized coefficient (Beta) for this predictor is 0.56, which is statistically significant ($t = 11.3$, $p < 0.001$). This Beta value suggests that the "PE total score" is a robust contributor to the model, explaining a substantial portion of the variance in QWL scores.

Collinearity diagnostics were conducted to assess multicollinearity among the predictor variables. The tolerance value for the single predictor variable is 1.000, while the variance inflation factor (VIF) value is also 1.000. These results indicate that there is no evidence of multicollinearity, as there was only one predictor variable in the model.

4 Discussion

4.1 Levels of PE and QWL among nurses

The current study findings demonstrate that the PE and QWL levels among Jordanian primary care nurses and midwives need improvement. Although the mean score for the PE total scale was 43.0147, which is slightly above the midpoint of the scale, the scores for the PE subscales were considered moderate. The highest score was found in the competence subscale, indicating that nurses and

TABLE 8 *Post hoc* test results for QWL based on selected variables among Jordanian primary care nurses and midwives ($N = 273$).

Variable	Subgroup comparison	Mean difference	*p*-value	Significance	Significant subgroup
Educational level	Diploma vs. Bachelor	10.46	0.015	Significant	Diploma
Educational level	Bachelor vs. Postgraduate	9.24	0.025	Significant	Postgraduate
Intention to leave the current workplace	Yes vs. No	11.01	0.021	Significant	No Intention
Intention to leave the nursing profession	Yes vs. No (Nursing)	20.45	0.000	Significant	No Intention
Intention to leave the nursing profession	Yes vs. No (Midwives)	17.63	0.010	Significant	No Intention

midwives perceived their abilities and skills to be the most empowering aspect of their work life. The low scores on the meaning and self-determination subscales suggest that the nurses feel a lack of purpose and autonomy in their work. The low scores on the meaning and self-determination subscales of the PE instrument in this study are consistent with previous research on nursing job satisfaction, which has shown that nurses often experience a lack of control and autonomy in their work (53–56). The nursing profession is known to be highly demanding and stressful, which can lead to feelings of burnout and a lack of meaning in work (57–59). The current study findings highlight the need for interventions that support the development of nurses' sense of meaning and autonomy in their work to improve their PE.

Regarding QWL, the mean score for the total scale was 130.92, which is below the midpoint of the scale, and according to Brooks (51), it falls into the moderate category. This suggests that Jordanian primary care nurses and midwives perceive their work life to be of low quality. The highest score was found in the Work Context Dimension subscale, indicating that the work environment and resources were perceived to be the most favorable aspects of their work life. On the other hand, the lowest score was found in the Work World Dimension subscale, indicating that nurses and midwives perceived their workload and job demands to be the least favorable aspect of their work life. The possible reasons for the low QWL scores in this study could be due to the high workload and stress associated with the nursing profession, which may lead to feelings of job dissatisfaction and burnout (60–62). Furthermore, the low QWL scores may be due to the lack of resources and support for nurses in the primary care setting in Jordan (63), such as limited opportunities for professional development and advancement (64), inadequate staffing levels, and inadequate compensation (65).

The findings of this study have several novel contributions to the existing literature. First, this study contributes to the literature by providing insights into the level of empowerment among primary care nurses in Jordan. The study's finding that the mean score for the PE total scale was slightly above the midpoint of the scale suggests that nurses and midwives in primary care settings in Jordan perceive themselves to be moderately empowered. This result is important as it highlights the need for interventions to enhance the level of empowerment among nurses and midwives in Jordan.

Second, the study's finding that the highest score was found in the competence subscale and the lowest score was found in the self-determination subscale is novel in the context of Jordanian primary care nurses and midwives. While previous studies have examined the relationship between psychological empowerment and job satisfaction or turnover intention among nurses in Jordan (27, 42, 66, 101), few studies have focused specifically on primary care nurses and midwives. Furthermore, few studies have examined the subscales of psychological empowerment and their relationship with quality of work life among nurses and midwives in Jordan. Therefore, this study contributes to the literature by shedding light on the specific aspects of PE that are most and least empowering for Jordanian primary care nurses and midwives.

Third, the study's finding that the QWL scores for Jordanian primary care nurses and midwives were moderate suggests that there is room for improvement in the QWL among this population. This finding is novel in the context of Jordanian primary care nurses and midwives as few studies have examined the quality of work life among this population. Therefore, this study contributes to the literature by providing insights into the specific dimensions of QWL that are most and least favorable for Jordanian primary care nurses and midwives.

In addition, the results of this study revealed that the determinants of PE among nurses in Jordan were not different from those nurses at regional or even international levels, which approve that the nursing profession must have certain environmental characteristics that support the nurses and improve the quality of work life which accordingly will support the nurse perception of psychological empowerment.

4.2 The relationship between PE, sociodemographic variables, and QWL among nurses

The findings of this study reveal a significant positive relationship between PE and QWL among Jordanian primary care nurses and midwives. This suggests that an increase in the level of PE corresponds to an improvement in QWL. This finding aligns with existing research in nursing and other fields, which has consistently demonstrated the positive associations of PE with various work-related outcomes, including job satisfaction (67, 68), organizational commitment (69), and work engagement (70). These positive outcomes have been linked to enhanced productivity, better patient outcomes, and lower turnover rates within the nursing profession (71).

Furthermore, it's noteworthy that the significant positive correlation between PE and QWL is a novel finding within the context of Jordanian primary care nurses and midwives. While previous research has explored the relationship between PE and job satisfaction across various healthcare settings (42, 72–74), few studies have specifically investigated the connection between PE and QWL in this particular population. Therefore, this study contributes valuable insights to the literature on employee well-being and sheds light on the factors that influence the QWL of primary care nurses and midwives in Jordan.

Nonetheless, it is important to acknowledge that not all studies have consistently demonstrated such strong associations between PE and work-related outcomes. Some research has revealed weaker or non-significant relationships between PE and factors like job satisfaction (75) and work engagement (76). Additionally, these findings suggest that while PE plays a significant role in fostering positive work-related outcomes, it may not be the sole determinant. Other factors, such as job resources (e.g., social support, job autonomy, feedback), have been identified as important predictors of job satisfaction and work engagement (77, 78). Hence, while the current study underscores the positive correlation between PE and QWL, it is essential to recognize that multiple factors can collectively influence work-related well-being.

Furthermore, the study's observation of a weak negative correlation between PE and weekly working hours suggests that extended working hours may negatively impact nurses' PE. This finding is consistent with prior research indicating that long working hours can lead to fatigue, stress, and burnout, subsequently diminishing nurses' sense of empowerment and work satisfaction (45). Additionally, extended working hours can disrupt the work-life balance, limiting opportunities for nurses to engage in activities that contribute to their well-being, such as spending time with family and friends or pursuing leisure activities (79–81).

However, it's important to acknowledge that some studies have reported no significant relationship between working hours and job satisfaction among nurses (82). These inconsistencies may stem from variations in study design, sample characteristics, and cultural and organizational factors.

Additionally, the weak positive correlation between QWL total scores and age implies that older nurses may experience better QWL. This observation may be attributed to the fact that older nurses typically have more experience and, as a result, may enjoy higher job satisfaction and job security (83). Overall, the study's findings underscore the potential for interventions aimed at enhancing PE to also improve the QWL of Jordanian primary care nurses and midwives. These insights are crucial for healthcare organizations when designing strategies to enhance employee well-being and overall productivity.

4.3 Differences in levels of QWL among nurses

The results of this research indicate that certain sociodemographic factors might influence the QWL of primary care nurses and midwives in Jordan. The results of this research indicate that certain sociodemographic factors influence the QWL of primary care nurses and midwives in Jordan. The results indicate that nurses with a diploma exhibited notably superior QWL ratings in comparison to those possessing a bachelor's degree. This finding may be attributed to the fact that nurses with higher than diploma degrees often undergo more extensive practical training, acquire higher experience, have more administrative responsibilities and burdens according to their job description, and more workload, resulting in a heightened feeling of competence and work satisfaction (84), accordingly increasing their quality of work-life needs, if not met, it leads to dissatisfaction. Additionally, nurses with bachelor's degrees encounter a greater number of administrative and bureaucratic duties (85), resulting in less time dedicated to patient care and a worse feeling of job satisfaction (86). The results align with other studies that indicated a positive correlation between nurses' educational attainment and their reported levels of work dissatisfaction (87).

Moreover, the findings suggest that nurses employed in Al-Salt had considerably elevated QWL ratings in comparison to their counterparts working in Amman. This may be attributed to several causes, including disparities in workload, work environment, and work culture. It is conceivable that nurses employed at Al-Salt would experience an improved work-life equilibrium because of a lower patient load or a more nurturing work atmosphere. On the other hand, nurses employed in Amman may encounter heightened levels of stress and workload as a result of the larger number of patients and the presence of more intricate situations. These results emphasize the significance of taking into account the work environment when assessing the quality of work life for nurses. The results of this research indicate that the desire to quit among primary care nurses and midwives in Jordan is a significant factor that might have a detrimental effect on their QWL. This aligns with other studies that have shown an inverse correlation between the desire to quit and work satisfaction (88, 89). Nurses contemplating departure from their present occupation, or the nursing field may encounter diminished levels of job satisfaction, engagement, and overall QWL.

Nonetheless, the factors contributing to the desire to quit among Jordanian primary care nurses and midwives may differ and need investigation in future studies. Work overload, insufficient salary, limited career advancement prospects, unfavorable working circumstances, and incidents of workplace violence are potential factors that may lead to nurses' intent to leave their jobs (90, 106). Furthermore, personal attributes such as personality characteristics and work ideals may also have an influence (91).

Future studies should focus on identifying the fundamental causes that lead to the intention to quit among primary care nurses and midwives in Jordan. This will enable the development of effective methods to address these problems and enhance the quality of work life. Potential avenues for study might include administering qualitative interviews or organizing focus groups with nurses to get a more comprehensive comprehension of their experiences, attitudes, and perspectives. Longitudinal studies may also be conducted to examine the impact of variables like burnout, stress, and work satisfaction on nurse turnover intentions over some time.

5 Implications and recommendations

The findings of this study have significant implications for practitioners in the nursing profession, including nurses, nurse managers, policymakers, and patients. Firstly, the study revealed that primary care nurses and midwives perceive a moderate level of PE and QWL. Therefore, it is recommended that nursing administrators and policymakers take the necessary steps to improve the work environment and conditions of primary care nurses and midwives in Jordan. One possible strategy is to offer training programs aimed at enhancing the sense of empowerment and motivation among nurses. This can be achieved by providing opportunities for nurses to develop new skills, gain new knowledge, and take on leadership roles in their workplaces. Additionally, nurse managers should make efforts to ensure that nurses have access to the necessary resources and support to perform their duties effectively and efficiently (104).

Secondly, the study revealed that the QWL of primary care nurses and midwives in Jordan varies based on their educational level and place

of employment. This implies that nursing managers and policymakers should consider developing and implementing targeted interventions to improve the work conditions and environments of nurses working in various locations and educational backgrounds. For instance, nursing administrators can offer incentives or create opportunities for nurses to advance their education, which can lead to a more favorable work environment and better patient outcomes. Furthermore, policymakers should collaborate with healthcare providers and relevant stakeholders to establish policies and procedures that promote work-life balance, flexible working schedules, and support for nurses who are experiencing burnout or stress. Nursing organizations have the opportunity to speak for their members as a whole on matters of utmost importance, such as nurse quality of work life and psychological empowerment, by identifying the difficulties and promoting solutions. By providing an evidence-based range of solutions that can be tailored to the requirements of members within their organizations, they play a crucial role in reshaping the narrative about the difficulties nurses confront to avoid perpetuating a victim attitude.

Thirdly, the finding that intention to leave is negatively associated with QWL has implications for nursing managers, policymakers, and patients. It is essential to develop strategies that can reduce turnover rates among primary care nurses and midwives in Jordan. One possible solution is to offer financial incentives, such as bonuses or salary increases, for nurses who have a high level of job satisfaction and are committed to their work. Additionally, nursing administrators should prioritize creating a supportive and inclusive work culture, where nurses feel valued and respected, and where they have opportunities for career growth and development.

Finally, patients also benefit from the findings of this study. The QWL of nurses is positively correlated with patient outcomes, such as patient satisfaction and quality of care. Therefore, healthcare providers and policymakers need to invest in initiatives that prioritize improving the working conditions and environments of nurses in Jordan. This will not only benefit nurses but also enhance the quality of care provided to patients.

The findings of this study have several implications for scholars and future research. This study highlights the need for further investigation into the factors that contribute to the psychological empowerment and quality of nurse work life of Jordanian primary care nurses and midwives. Future studies could explore the role of specific organizational and environmental factors that may affect these outcomes, such as leadership style, communication patterns, workload, and the physical work environment. In addition, this study contributes to the limited body of literature on the psychological empowerment and quality of work life among nurses and healthcare professionals in the Middle East. Given the unique cultural and societal contexts in this region, there is a need for further research that explores the specific challenges and opportunities faced by healthcare professionals in this context.

The significant differences in QWL scores based on educational level and place of employment suggest that these factors may be important in shaping the work experiences of nurses and midwives in Jordan. Further research could investigate the mechanisms through which education and work location influence QWL and explore potential interventions to improve the work experiences of nurses and midwives in these contexts.

Based on the study findings, several practical recommendations can be made for improving the PE and QWL. Nurse managers should prioritize creating a work environment that promotes PE by providing opportunities for professional development and growth, encouraging autonomy and decision-making, and recognizing and rewarding nurses for their accomplishments. Additionally, managers should consider reducing the workload and providing support and resources to nurses, particularly those who work long hours or have higher workloads. Policy makers should recognize the importance of investing in nursing education and training programs that emphasize the development of PE skills and competencies. This can include courses on leadership, decision-making, and critical thinking, as well as programs that promote collaboration and teamwork among nurses. Efforts should be made to improve the QWL of primary care nurses and midwives by addressing factors such as pay, benefits, workload, and working conditions. Policymakers should work with healthcare organizations to establish policies and guidelines that ensure fair compensation, reasonable work hours, and safe working conditions.

One of the main strengths of this study is its focus on the PE and quality of nurse work life of primary care nurses and midwives in Jordan. This is a relatively understudied population in the literature, and the findings provide valuable insight into the experiences of this group of healthcare professionals. Another strength of the study is its use of validated scales to measure psychological empowerment and quality of nurse work life, which enhances the validity and reliability of the results. The sample size of 273 participants is also relatively large, which increases the generalizability of the findings to similar populations in Jordan and potentially other countries in the Middle East region.

Several limitations should be considered when interpreting the results of this study. The research was confined to primary care nurses and midwives in Jordan, potentially limiting the generalizability of the findings to other healthcare settings or countries. The use of self-reported measures could introduce social desirability bias, as participants might have provided socially acceptable responses. Additionally, the study did not explore the specific reasons underlying the differences in QWL based on participants' educational levels and workplace settings, leaving room for future research to explore this aspect further. Finally, the study did not investigate other potentially influential variables, such as workload, job demands, and social support, which could impact both psychological empowerment and the quality of nurses' work lives. So, future research must specify the relationship between PE and QWL using demographic sociological variables with statistical differences as control variables using conceptual or theoretical frameworks. One additional limitation to consider is that the survey instrument, BQNWL, was originally developed for nurses and may not fully capture the unique experiences and perspectives of midwives, potentially affecting the applicability of the results to this specific professional group.

6 Conclusion

In conclusion, this study aimed to assess the relationship between PE and QWL among Jordanian primary care nurses and midwives. The study utilized a cross-sectional design with a sample of 273 nurses. The results showed that the levels of PE and QWL among Jordanian primary care nurses and midwives need improvement, particularly in the areas of meaning and self-determination in the PE scale, and the Work World Dimension subscale in the QWL scale. The low scores on

the meaning and self-determination PE subscales indicated that the nurses feel a lack of purpose and autonomy in their work, consistent with previous research on nursing job satisfaction internationally and in the region. The nursing profession is known to be a highly demanding and stressful job, which can lead to feelings of burnout and a lack of meaning in work. Therefore, the current study findings highlight the need for interventions supporting nurses' sense of meaning and autonomy at work to improve their PE.

Additionally, the study found a significant positive relationship between PE and QWL. Besides, there were significant differences in QWL scores based on educational level and place of employment and a significant negative relationship between intention to leave and QWL.

The study's findings have several implications for nursing practitioners, nurse managers, policymakers, patients, and scholars. Practical recommendations include the need to prioritize interventions to improve the QWL and PE levels of primary care nurses and midwives in Jordan, through providing opportunities for professional development, job autonomy, and increasing nurses' involvement in decision-making processes.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

AA-O: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. RA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. MG: Methodology, Supervision, Validation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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EDITED BY
Nian-Sheng Tzeng,
National Defense Medical Center, Taiwan

REVIEWED BY
Antonio P. Gutierrez de Blume,
Georgia Southern University, United States
Gohar Wajid,
World Health Organization, EMRO, Egypt

*CORRESPONDENCE
Sultan Ayoub Meo
✉ sultanmeo@hotmail.com;
✉ smeo@ksu.edu.sa

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Decoding the interplay of medical professionalism, mental well-being, and coping in undergraduate medical students across culture: using structural equation modeling

Kamran Sattar[1], Sultan Ayoub Meo[2]* and Muhamad Saiful Bahri Yusoff[3]

[1]Department of Medical Education, College of Medicine, King Saud University, Riyadh, Saudi Arabia, [2]Department of Physiology, College of Medicine, King Saud University, Riyadh, Saudi Arabia, [3]Department of Medical Education, School of Medical Sciences, University Sains Malaysia, Kota Bharu, Malaysia

Introduction: The rigorous nature of medical education, long and night shifts, and prevalent issues like stress, anxiety, and depression affect medical students' mental well-being and medical professionalism. This study aims to explore the intricate relationships between mental well-being, medical professionalism, and coping strategies, among undergraduate medical students, utilizing structural equation modeling (SEM) to unravel these dynamics.

Methods: Conducted at Universiti Sains Malaysia, this cross-sectional study involved 234 medical students from the 1st, 3rd, and 5th years of the MBBS program. Data were collected via five validated survey instruments: DASS-9, TEQ, Dundee, Brief COPE, and CBI, through Google Forms. Participants were selected using purposive sampling. The surveys assessed mental well-being (burnout, anxiety, depression, stress), coping strategies, and medical professionalism attributes. Model fit was evaluated using established indices.

Results: Findings indicated that professional behavior reduces burnout and negatively impacts negative coping strategies (NCSs). Additionally, medical professionalism indirectly enhances empathy and positively influences CSs. Conversely, psychological distress increases NCSs and reduces empathy. Positive coping strategies (PCSs) enhance empathy levels, while MWB issues elevate NCSs.

Discussion: The study underscores the vital role of professional behavior in mitigating burnout and fostering positive coping mechanisms among medical students. Addressing MWB issues through targeted interventions can enhance empathy and professional behavior, ultimately improving the quality of patient care.

KEYWORDS

relationship, medical professionalism, mental well-being, coping, undergraduate, medical students, medical education, cultural contexts

Introduction

Medical students confront a myriad of stressors throughout their training, which inevitably takes a toll on their mental well-being. Comparisons with the overall populace reveal an increase in mental disorders among medical students, indicating a pressing concern for their holistic health (1). The demanding nature of medical education, characterized by the need to assimilate extensive information for examinations, adds an additional layer of pressure to an already challenging environment (2). Hence, the mental well-being of medical students is currently gaining significant attention globally, largely due to their essential role as the backbone of future healthcare systems (3, 4). It is clear that mental well-being issues, such as psychological distress (including stress, anxiety, and depression) and burnout, are prevalent among healthcare professionals (5, 6). Hence, unidentified and untreated burnout and a distressed life are sure to hurt their health (individual), their performance (interpersonal), and their level of care for patients (societal). It is still not fully understood how the above relationships work. Moreover, factors such as long work shifts (7), night shifts (8), and emerging issues like stress, anxiety, and depression (9) further exacerbate these challenges, casting a shadow over the well-being of medical students.

The goal of medical education is to develop doctors who are both healthy and competent so that they can better serve the community (10). However, in recent decades, the medical profession has faced heightened scrutiny and criticism for both perceived and actual violations of professional behavior. Numerous studies have been conducted on unprofessional conduct among trainee doctors. Research by Resnick et al. (59) found that professional misconduct is common among US general surgery residents and can lead to their dismissal from the training program. The challenges associated with unprofessional behavior do not arise solely after one qualifies as a physician. Research and medical authorities indicate that the issues often stem from the early years of medical training. The General Medical Council underscores the importance of fostering professional behaviors in medical students starting from their initial undergraduate years (60). There are growing concerns about the decline in professionalism among students (61) and its links to reduced job performance and burnout (62). The significance of medical professionalism is gaining renewed attention among healthcare professionals and society to address these concerns and enhance awareness of the social responsibilities of medicine. Additionally, it has become increasingly recognized and accepted in recent years that the most effective approach is to realign medical education and practice with its fundamental values of professionalism (63). It is, therefore, essential to enhance students' learning around the attributes of medical professionalism during undergraduate medical education (64). However, a concerning trend of declining professionalism attributes among medical students during their training poses a significant threat to professionalism and, consequently, patient care quality (11). The scope of medical professionalism differs throughout the world with different cultural contexts (12) but typically includes values such as altruism, accountability, and a commitment to excellence, as recognized by organizations like the American Board of Internal Medicine (13). Recognizing the pivotal role that medical students play in shaping the future of healthcare systems, it becomes imperative to address issues related to mental well-being, including burnout and psychological distress, to ensure the cultivation of empathetic and ethical healthcare professionals (3, 4).

Coping refers to the mental, emotional, and behavioral efforts made to manage a challenging relationship between an individual and their environment (14). Research has shown that both individual characteristics and situational factors can affect coping. In a review, Skinner et al. (15) noted that while hundreds of coping strategies are currently under evaluation, these strategies generally fall into five primary categories: problem-solving, support-seeking, avoidance, diversion, and positive cognitive restructuring.

At the undergraduate level, utilisation of coping strategies (CSs) for discrete mindfulness and the level of medical students' mental well-being might play a crucial role in leading them towards medical professionalism attributes or even an unprofessional act (i.e., professionalism laps). There is a global trend in the use of both positive and negative coping strategies (NCSs). Problem-focused coping seeks to reduce or eliminate the source of stress, while emotion-focused coping changes the way an individual responds to stressors.

Literature suggests that CSs are vital for well-being (16). According to Zajacova and Lynch (17), stress is prevalent among students in academic settings. Therefore, a student's ability to choose and employ effective coping strategies (CS) to mitigate psychological distress is linked to their other personal resources (18). Such situations highlight the necessity of developing a plan to identify the relationships between medical professionalism and mental well-being. This approach can assist medical educators in recognizing, exploring, and improving their strategies to address instances of unprofessional behavior among students (19).

Identifying these interrelations will allow medical educators to positively influence students' professional behavior, enhancing their understanding of professionalism. This, in turn, will help achieve the fundamental goal of medical education: producing "well-being doctors" capable of addressing the needs of patients and the community.

As depicted in Figure 1, the existing literature reveals a scarcity of evidence regarding the impact of mental well-being issues on the professionalism of medical students. Current reports fail to adequately explore the causal relationships between these two critical domains: mental well-being and medical professionalism. Additionally, there is a notable gap in our understanding of the role of coping mechanisms as a mediator in the relationship between mental well-being indicators (including stress, anxiety, depression, and burnout) and attributes of medical professionalism (such as professional behavior and empathy).

Despite the paramount importance of understanding the intricate relationship between coping strategies (CSs), mental well-being, and medical professionalism among medical students, this area remains relatively unexplored in the existing literature. Exploring these interconnections holds significant promise for unravelling the complex dynamics that influence individual health, interpersonal relationships, and ultimately, the quality of patient care (5, 6). By investigating these relationships, researchers can shed light on how the structure and content of medical education programs impact student well-being and medical professionalism, paving the way for targeted interventions and improvements in medical training practices.

The objective of our study is to examine the causal-effect relationship of medical professionalism, CSs, and mental well-being

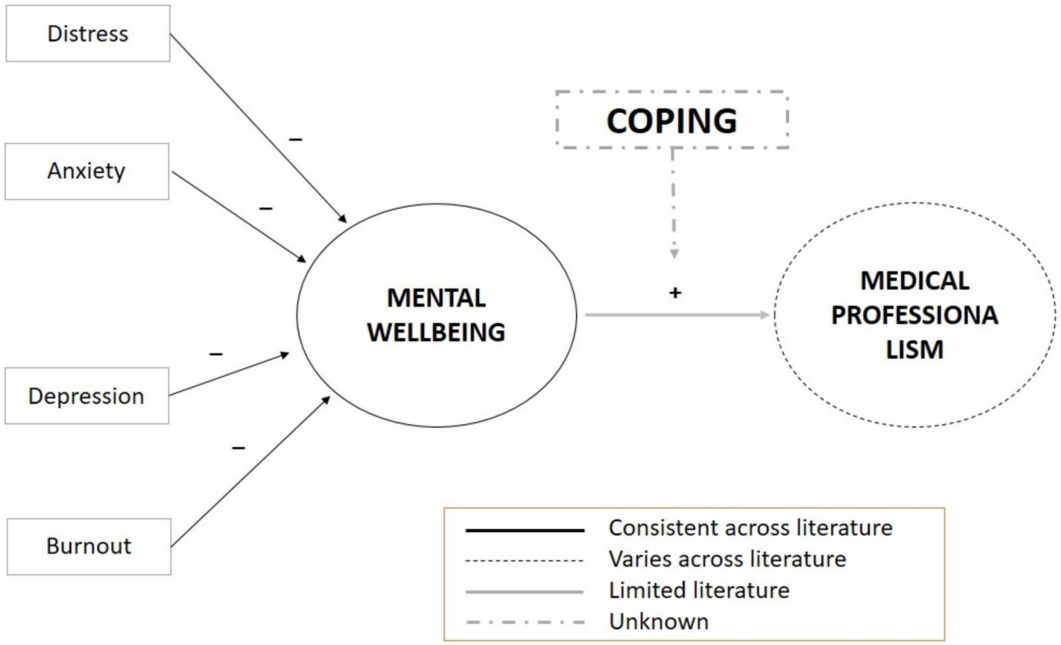

FIGURE 1
Theoretical framework.

issues using structural equation modeling. Therefore, the relevant research question we have; what is the relationship amid medical professionalism, mental well-being and coping strategies among healthcare professionals?

We have formulated the following hypotheses aligning with our objective to examine the causal-effect relationships using structural equation modeling (SEM). These shall guide the analysis of the relationships between medical professionalism, coping strategies, and mental well-being.

> *Hypothesis 1 (H1)*. Higher levels of medical professionalism are associated with better mental well-being among healthcare professionals.
>
> *Hypothesis 2 (H2)*. Mental wellbeing issues negatively influence medical professionalism.
>
> *Hypothesis 3 (H3)*. Mental well-being issues hinder usage of positive coping.
>
> *Hypothesis 4 (H4)*. Mental well-being issues are associated with negative coping.

Methodology

Study design

Authors selected quantitative correlational study design for this study as it allows for the rigorous examination of causal relationships and complex interactions among variables, providing valuable insights that can inform practice and policy.

Setting

The medical curriculum at Universiti Sains Malaysia follows the student-centered, problem-based learning, integrated teaching, community-based, electives and systematic (SPICES) educational model, spanning 5 years with pre-clinical and clinical phases. The pre-clinical years focus on fundamental biology and early clinical exposure, while the clinical phase emphasizes practical skills in real healthcare settings. This study was conducted using Google Forms, offering accessibility, cost-effectiveness, time efficiency, and scalability in data collection, aligning with modern research practices.

Participants

Data were collected using five survey questionnaires from 234 subjects. Kline (65) suggests a minimum sample size of 200 subjects for structural equation modeling (SEM) analysis. Factoring in a 30% non-response rate, the estimated sample size required for this study was 323 medical students.

At the beginning, we distributed the questionnaires to all undergraduate medical students studying in the years 1, 3 and 5 at Universiti Sains Malaysia, Health Campus, Kelantan. After the formal announcements (through student class leaders), the online link for the survey was sent to only those who showed their willingness by replying through emails or WhatsApp messages. They were from diverse levels of study (years 1, 3, and 5). The class leaders' announcements for the research were made so that the interested student may contact the concerned person who shall discuss with students all the details about the research surveys (e.g., consent, time, date, venue, duration, potential benefits, and potential risks).

Data collection

The primary data for structural equation modeling (SEM) came from responses gathered via five survey questionnaires in a cross-sectional study. A purposive sampling method was applied to 234 medical students across the 1st, 3rd, and 5th years at Universiti Sains Malaysia's Health Campus in Kelantan. The purpose of collecting data from medical students in their first, third, and fifth years was to expect a variety of responses and to learn about and collect a variety of factual situations and life experiences experienced by medical students at different phases about CSs, mental well-being issues (MWBi), and medical professionalism, throughout their undergraduate medical career. During the cross-sectional study, we investigated the level of mental well-being (burnout, anxiety, depression, stress) CSs, and medical professionalism attributes at a single time frame (October 2022–November 2022) using validated instruments listed with their respective determinants in Table 1.

A detailed meeting among the research team was held to finalize the inventories, a consensus was achieved on the list of instruments, and later in a subsequent meeting, an agreement was sought on selecting items from the selected inventories to be utilized. The criteria for selecting or omitting items from the selected inventories were based on our objectives. Two inventories, i.e., Distress Anxiety Stress Scale-9 (DASS-9) and Toronto Empathy Questionnaire (TEQ) were selected to be used as it is, whereas three inventories, i.e., Dundee, Brief Coping Orientation to Problems Experienced (COPE), and Copenhagen Burnout Inventory (CBI) were used with reduced items to best match our objectives. For the Dundee inventory, we selected eight items (from a total of 34), Brief COPE; 12 items (from a total of 28), and CBI; 13 items (from a total of 19).

As mentioned earlier, to best depict the construct of interest, from Dundee inventory, we selected and utilized eight types of professionalism lapse items. The Dundee inventory (Poly-professionalism Inventory I: Academic Integrity), developed and validated by Roff et al. (20, 21), has been frequently used as customized (22, 23). The author of the brief COPE inventory, Charles S. Carver has allowed to use this inventory as complete or any scales relevant to the researchers' needs. Brambila-Tapia et al. (24) used reduced items (14) for their study. We also performed an item reduction for Brief COPE, leaving only the most representative subscales for positive (adaptive) and negative (maladaptive) coping. This way, we were able to have 6 items relevant to each (positive and negative) coping strategy. Concerning CBI, out of the 19, we identified and used 13 survey items to best represent the constructs of interest. It's a practice of researchers to carefully select which type of burnout among the three (personal, work, and client-related) to be selected, as Huang et al. (25) did not measure work-related burnout but only personal-related and patient-related. Considering our research needs, we also did not measure client-related burnout as it did not match our research objectives.

A summary detailing the item distribution, with response categories and score interpretation, is available (Table 2). Five inventories with the final items are mentioned in Appendix N. Furthermore, we evaluated model fit using established indices (Table 3) supported by widespread literature.

Since, the SEM utilized the maximum likelihood (ML) method, known for its asymptotically unbiased and efficient estimator (26), it helped us prioritize minimizing bias in the analysis process to ensure accurate results.

TABLE 1 Five survey questionnaires with respective determinants.

Questionnaire	Determinants
Dundee Polyprofessionalism Inventory I: Academic Integrity (Dundee Inventory)	Professional behavior score
Depression, Anxiety, and Stress Scales DASS-9	Depression, anxiety, & stress score
Brief COPE	Coping score
Copenhagen Burnout Inventory	Burnout score
Toronto Empathy Questionnaire	Empathy score

All the survey questionnaires are included in Appendix N. DASS-9, Depression, Anxiety and Stress Scale; Brief COPE, Brief Coping Orientation to Problems Experienced; CBI, Copenhagen Burnout Inventory; TEQ, Toronto Empathy Questionnaire.

Statistical method

Using SPSS version 20, we conducted a descriptive analysis of demographic information. Samples having full responses to all inventories underwent SEM analysis using Analysis of Moment Structure (AMOS 29). We utilized five validated scales to meet research needs and conducted confirmatory factor analysis (CFA) to test measurement model fit for each construct.

Measurement model

CFA delineated observed variables for latent constructs and model fit was assessed for all items across five inventories. Composite reliability (CR) was calculated using Microsoft® Excel® with the following formula;

$$\frac{\left(\sum \lambda_i\right)^2}{\left(\sum \lambda_i\right)^2 + \sum \varepsilon_i}$$

whereby λ (lambda) is the standardized factor loading for item i and ε is the respective error variance for item i. The error variance ε is estimated based on the value of the standardized loading (λ) as $\varepsilon_i = 1 - \lambda^2_i$.

Steps of SEM analysis

The researcher prioritized minimizing bias in the analysis process to ensure accurate results. SEM utilized the maximum likelihood (ML) method, known for its asymptotically unbiased and efficient estimator (26). Moreover, we followed five logical steps in SEM: (1) model specification, (2) identification, (3) parameter estimation, (4) model evaluation, and (5) model modification (66–68). Our study aimed to identify causal relationships between medical professionalism and mental well-being, ensuring association, time order, and non-spuriousness. Association between variables, indicating correlation, was a starting point for establishing causality, emphasizing statistical significance. Time order was crucial; the cause must precede the effect logically. Non-spurious relationships were sought through study design and meticulous data collection. In

TABLE 2 Detailed summary of validated study instruments.

Instrument	Domains	No. of items	Response categories	Score interpretation
Dundee Inventory	Unprofessional behavior	8	"1. Ignore (None)" "2. Reprimand (verbal warning)" "3. Reprimand (written warning)" "4. Reprimand, plus mandatory counseling" "5. Reprimand, counseling, extra work assignment" "6. Failure of specific class/remedial work to gain credit" "7. Failure of a specific year (repetition allowed)" "8. Expulsion from college (readmission after one year possible)" "9. Expulsion from college (no chance for readmission)" "10. Report to a regulatory body"	Mean and SD
Depression, Anxiety and Stress Scale (DASS-9)	Depression	3	"0—Did not apply to me at all" "1—Applied to me to some degree, or some of the time" "2—Applied to me to a considerable degree or a good part of the time" "3—Applied to me very much, or most of the time"	Normal scores were treated as negative screening, and mild to extremely severe were treated as positive screening
	Anxiety	3		
	Stress	3		
Brief Coping Orientation to Problem Experienced (Brief COPE)	Denial	2	"1—I have not been doing this at all" "2—I have been doing this a little bit" "3—I have been doing this a medium amount" "4—I have been doing this a lot"	Mean and SD
	Substance use	2		
	Support-emotional	2		
	Self-blame	2		
	Religion	2		
	Acceptance	2		
Copenhagen Burnout Inventory (CBI)	Personal-related	6	"100—Always/To a very high degree" "75—Often/To a high degree" "50—Sometimes/Somewhat" "25—Seldom/To a low degree" "0—Never/Almost never/To a very low degree"	Average scores were calculated for each domain An average score of 50 or above is treated as burnout
	Work-related	7		
Toronto Empathy Questionnaire (TEQ)	Empathy-positive worded items	8	"Never = 0" "Rarely = 1; Sometimes = 2" "Often = 3" "Always = 4"	Sores are summed to derive the total for the Toronto Empathy Questionnaire, which can range from 0 to 64
	Empathy-negative worded items	8		

SEM, path analysis diagrams were created, and analyses were conducted following AMOS guidelines. Standardized estimates were utilized for their consistency across variables with different measurement scales. This approach allowed the comparison of exogenous variables' (with no arrows pointing to, are exogenous variables) effects on endogenous variables (the variables to which arrows point are endogenous), facilitating the recognition of causal relationships.

Results

Demographic data

Survey questionnaires were distributed to a total of 800 students and 234 students participated, including 95 (40.6%) from the first, 41 (17.55) third, and 98 (41.9) fifth year of the medical course. Participants were primarily female (78.2%), the overriding race was Malaysian (76.9%), and the majority (41.9%) were from the fifth year of study. The demographic distribution is highlighted in Table 4.

Measurement and structural model findings

Table 5 shows the CFA findings and helped to assess model fit with measurement models of professional behavior (Appendix B) and mental well-being (Appendix C). Similarly, Appendix D depicts a model for positive coping strategies (PCS) which was evaluated using six items. However, initial attempts to model negative coping strategies (NCS1) were unsuccessful due to poor factor loading of two items (Appendix E), which were subsequently removed. The revised model (NCS2) with four items (Appendix F) demonstrated acceptable fit indices (Table 3). Moreover, the burnout model (Appendix G)

comprised 13 items and achieved a satisfactory model fit. Likewise, empathy (Appendix H) with 16 items attained model fit.

Appendix I depicts the results of each latent construct with relevant manifest constructs.

During SEM, the Variable terms used for our structural models with respective intended concepts are enlisted in Table 6. Results of the goodness of fit indices for the mental well-being (MWB) and medical professionalism (MP) relationship, with mediating effects of CSs (positive and negative), are summarized in Table 7.

Our study revealed that initial Model 1 (Figure 2), examining causal-effect relationships, did not fit well despite good GFI (0.979) and acceptable CFI (0.935). Model modification improved fit to create Model 2.

Figure 3 shows Model 2 which exhibited better-fit indices: Chi-square/df = 1.459, TLI = 0.981, CFI = 0.997, RMSEA = 0.044, GFI = 0.997, NFI = 0.990 (Table 7). No post-hoc modifications were needed due to the good fit index. Furthermore, Model 2's direct, indirect, and total effects on the model paths are presented in Tables 8, 9.

Our study revealed that psychological distress significantly reduced empathy levels in undergraduate medical students. Additionally, psychological distress significantly contributed to burnout ($\beta = 0.567$, p-value <0.001) in undergraduate medical students (Table 8). This was in align with our predicted H2. Hypothesis (H1) predicted, and our study also revealed that there was a significant influence of professional behavior on burnout ($\beta = -0.306$, $p < 0.001$). Additionally, professional behavior significantly affects empathy indirectly ($\beta = 0.055$) as shown in Table 9.

According to our results, Model 3 achieved acceptable fit indices (Table 7) and underwent modifications based on AMOS recommendations to enhance theoretical coherence. Specifically, adjustments included covariances between indicators (BCOPE5 and BCOPE6) and (BCOPE11 and BCOPE12) for the latent variable PCS (Figure 4). The results of this model informed that psychological distress influenced the use of positive coping strategies. As predicted by H3, psychological distress acted as an inhibitor for positive coping strategies, mediating through burnout and significantly reducing their use ($p < 0.05$). This model also confirmed that positive coping strategies as contributing factors for empathy.

Results also indicate that students' ability to employ positive coping strategies decreases with burnout. Despite psychological distress prompting the use of positive coping strategies, its mediating effect through burnout significantly reduces their utilization among medical students. Furthermore, positive coping strategies enhance empathy, with a standardized direct effect of 0.253 (Tables 10, 11) this was predicted in H4.

This study further revealed that Model 4 (Figure 5) helped us investigate the effects of NCS2 on medical students' medical professionalism and mental well-being. This model has met the criteria for model fit: Chi-square/df = 1.822, $p = 0.026$, TLI = 0.946, CFI = 0.961, RMSEA = 0.059, GFI = 0.972, and NFI = 0.956 (Table 7). Moreover, as

TABLE 3 Various fit indices with levels of acceptance.

Name of category	Name of index	Level of acceptance
Absolute fit	"Root mean square for error approximation" (RMSEA)	<0.08 (69)
	"Goodness of fit index" (GFI)	>0.9 (70)
Incremental fit	"Comparative fit index" (CFI)	>0.9 (71)
	"Tucker–Lewis index" (TLI)	>0.9 (72)
	"Normed fit index" (NFI)	>0.9 (73)
Parsimonious fit	"Chi-square/degree of freedom" (v2/df)	<5 (74)

TABLE 4 Demographics of the study participants ($n = 234$) for surveys.

Demographic characteristics ($n = 234$)	n (%)
Medical course	
1st year	95 (40.6)
3rd year	41 (17.5)
5th year	98 (41.9)
Personal demographics	
Gender	
Male	49 (20.9)
Female	183 (78.2)
Prefer not to say	2 (0.9)
Race	
Malay	180 (76.9)
Indian	26 (11.1)
Chinese	22 (9.4)
Other	6 (2.5)

TABLE 5 Results of CFA for all inventories (the measurement model of constructs).

Inventories		Determinants	CFA parameters obtained					
			χ^2/df=	p	TLI	CFI	RMSEA	CR
Polyprofessionalism		Professional behavior	1.005	0.441	1.000	1.000	0.005	0.765
DASS-9		Depression, anxiety, and stress	1.127	0.319	0.992	0.996	0.023	0.830
Brief COPE	*NCS2	Negative coping strategies (4 items)	3.681	0.055	0.948	0.991	0.107	0.596
	**PCS	Positive coping strategies (6 items)	1.352	0.221	0.991	0.996	0.039	
CBI		Burnout	1.020	0.434	0.999	1.000	0.009	0.928
TEQ		Empathy	0.820	0.855	1.000	1.000	<0.001	0.138

Depression, Anxiety and Stress Scale (DASS-9), *Negative Coping Strategies (NCS), **Positive Coping Strategies (PCS); taken from Brief Coping Orientation to Problems Experienced (Brief COPE), Copenhagen Burnout Inventory (CBI), Toronto Empathy Questionnaire (TEQ). Chi-square (χ^2), Degree of freedom (df), p-value (p), Tucker–Lewis index (TLI), Comparative fit index (CFI), Root mean square error of approximation (RMSEA), Composite reliability (CR).

predicted by H4, the results regarding negative coping strategies (NCS), indicated that mental well-being issues (burnout and psychological distress) significantly contributed to NCS. While professional behavior does not directly influence NCS2, a significant indirect effect was observed as an inhibitor through burnout ($\beta = -0.113$, $p < 0.05$) for negative coping strategies. This implied that professional behavior decreases the usage of NCS among medical students (Tables 12, 13).

Discussion

Our study demonstrates that professional behavior significantly decreases burnout levels among medical students, indicating that a strong understanding and practice of professionalism may mitigate the risk of burnout. The support for Hypothesis 1 suggests that higher levels of medical professionalism are associated with improved mental well-being, aligning with previous studies that have emphasized professionalism as a buffer against burnout in healthcare settings. Prior research showing a correlation between burnout and unprofessional behaviors, as well as compromised patient care standards (27–29). Specifically, our findings resonate with Brazeau et al. (30), who identified an inverse relationship between burnout levels and professionalism scores. Similarly, Dyrbye et al. (31) linked burnout with self-reported unprofessional behaviors among physicians. These results underscore the global prevalence of burnout in medical schools (32), and the inverse relationship we observed suggests that fostering a strong sense of professionalism in students may serve as a buffer against burnout, ultimately enhancing patient care standards. Our work highlights the critical role of professionalism in medical education, recommending that medical schools integrate comprehensive professionalism training to reduce burnout and improve healthcare outcomes.

Our study reveals that professional behavior demonstrates an indirect positive influence on the empathy levels of medical students by mitigating burnout. This finding aligns with global medical guidelines, such as those from the General Medical Council (GMC) in the UK and the Association of American Medical Colleges (AAMC), which emphasize the integral role of empathy in medical

TABLE 6 Variables terms used for our SEM models with respective intended concepts.

Variable terms	Intended concepts
PDScore	Psychological distress
BurnoutScore	Burnout
TEQScore	Empathy
PolyScore	Professional behavior
PCS	Positive coping strategy
NCS	Negative coping strategy

TABLE 7 The goodness of fit indices for supporting the best-fit model.

Models	The goodness of fit indices						
	χ^2/df	*p*-value	TLI	CFI	RMSEA	GFI	NFI
Model 1 (MWBi-MP)	10.549	0.001	0.608	0.935	0.202	0.979	0.931
Model 2 (modified MWBi-MP)	1.459	0.227	0.981	0.997	0.044	0.997	0.990
Model 3 (MWBI-PCS-MP)	1.456	0.045	0.973	0.982	0.044	0.965	0.947
Model 4 (MWBi-NCS-MP)	2.193	0.000	0.946	0.966	0.072	0.949	0.941

Chi-square (χ^2), Degree of freedom (df), *p*-value (*p*), Tucker–Lewis index (TLI), Comparative fit index (CFI), Root mean square error of approximation (RMSEA), Goodness of fit index (GFI), Normed fit index (NFI).

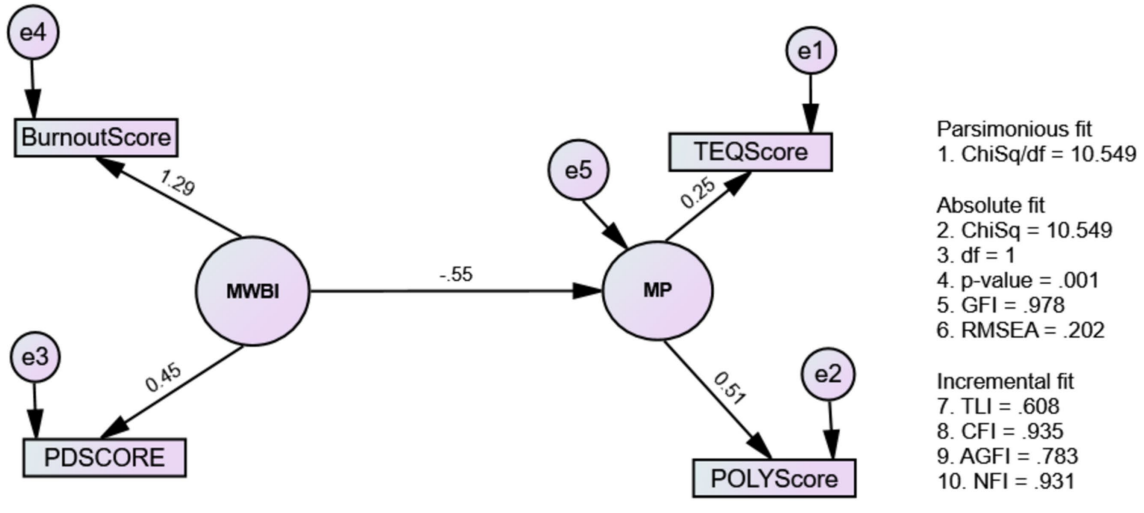

FIGURE 2
The causal-effect relationship between mental well-being issues and medical professionalism (Model 1: MWBi-MP).

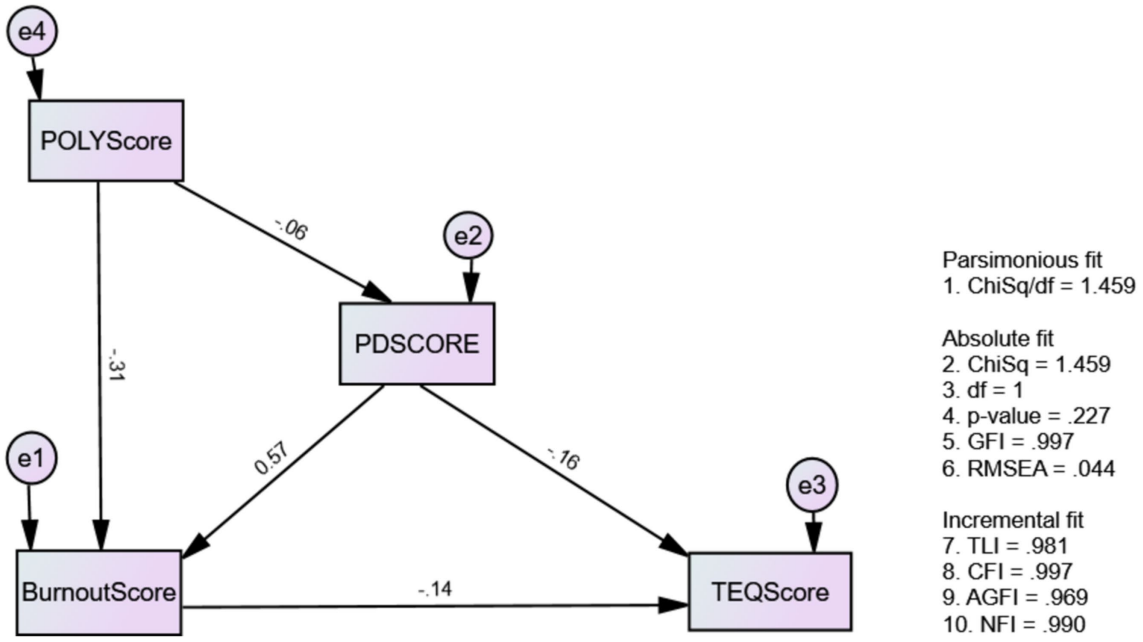

FIGURE 3
The modified causal-effect relationship between mental well-being issues and medical professionalism (Model 2: modified MWBi-MP).

TABLE 8 The estimates of standardized and unstandardized regression weights of variables for Model 2.

Observed variables		β	B	SE	p-values
Professional behavior (PolyScore)	Psychological Distress (PDScore)	−0.059	−0.025	0.028	0.371
	Burnout (BurnoutScore)	−0.306	−0.268	0.043	<0.001
Psychological distress (PDScore)	Burnout (BurnoutScore)	0.567	1.174	0.102	<0.001
	Empathy (TEQScore)	−0.159	−0.254	0.125	0.042
Burnout (BurnoutScore)	Empathy (TEQScore)	−0.136	−0.105	0.060	0.082

β = standardized regression weights; B = unstandardized regression weights; SE = standard error.

professionalism. Similar to our findings, previous studies have highlighted the relationship between reduced burnout and enhanced empathy among healthcare professionals. We postulate that professional behavior fosters a supportive learning environment, reducing stress and burnout, which in turn enhances empathy among medical students. Supporting this assumption, studies such as those by Shanafelt et al. (27) and Dyrbye et al. (33) have demonstrated that lower burnout levels correlate with higher empathy and better patient care. However, our study's limitations include potential biases from self-reported measures and its cross-sectional design, which limits causal inferences. Despite these limitations, our findings highlight the importance of integrating professionalism training in medical curricula to foster empathy, reduce burnout, and ultimately improve patient care. We recommend that medical schools adopt comprehensive professionalism programs, which could have significant implications on fostering empathy, reducing burnout, and also improving medical education, thus leading to better patient outcomes and enhanced healthcare delivery.

Our study indicates that positive professional behavior indirectly reduces negative coping strategies (NCSs) among medical students. This finding aligns with existing literature suggesting that coping strategies are influenced by personality traits and attributional styles (34). Similar to our findings, previous research has shown that individuals with proactive, problem-oriented strategies tend to employ positive coping strategies (PCSs), while NCSs are negatively correlated with traits such as agreeableness and conscientiousness (35). We postulate that nurturing medical professionalism helps students avoid negative coping methods by promoting positive behaviors and encouraging social support, thereby enhancing their mental well-being. Supporting this assumption, the literature indicates that professionalism can foster a helpful educational atmosphere that mitigates stress and promotes healthy coping mechanisms (36). Our findings indicate the importance of incorporating professionalism training into medical curricula to promote healthy coping strategies. This has significant implications for medical education, suggesting that such training could advance learners' mental health and overall well-being, ultimately leading to improved patient care.

This study highlights the significant impact of burnout on the coping strategies of medical students, influencing both positive coping strategies (PCSs) and negative coping strategies (NCSs). Similar findings have been reported globally, reflecting the increasing prevalence of emotional exhaustion among healthcare workers. For instance, studies in Saudi Arabia (37) revealed high rates of burnout and depression

TABLE 9 The unstandardized and standardized estimates of direct, indirect, and total effects for variables relationships for Model 2.

Parameter	Variables relationship		Total (95% CI)	Direct (95% CI)	Indirect (95% CI)
Unstandardized	PolyScore	PDScore	−0.025 (−0.078, 0.034)***	−0.025 (−0.078, 0.034)***	—
	PolyScore	BurnoutScore	−0.297 (−0.407, −0.176)**	−0.268 (−0.358, −0.176)**	−0.029 (−0.089, 0.040)***
	PDScore		1.174 (0.950, 1.384)**	1.174 (0.950, 1.384)**	—
	PolyScore	TEQScore	0.037 (0.001, 0.092)*	—	0.037 (0.001, 0.092)*
	PDScore		−0.377 (−0.578, −0.177)**	−0.254 (−0.507, 0.013)***	−0.123 (−0.306. 0.037)***
	BurnoutScore		−0.105 (−0.248, 0.032)***	−0.105 (−0.248, 0.032)***	—
Standardized	PolyScore	PDScore	−0.059 (−0.186, 0.076)***	−0.059 (−0.186, 0.076)***	—
	PolyScore	BurnoutScore	−0.340 (−0.466, −0.200)**	−0.306 (−0.404, −0.190)**	−0.033 (−0.101, 0.048)***
	PDScore		0.567 (0.474, −0.649)**	0.567 (0.474, 0.649)**	—
	PolyScore	TEQScore	0.055 (0.001, 0.130)*	—	0.055 (0.001, 0.130)*
	PDScore		−0.236 (−0.358, −0.109)**	−0.159 (−0.313, 0.010)***	−0.077 (−0.181, 0.024)***
	BurnoutScore		−0.136 (−0.309, 0.049)***	−0.136 (−0.309, 0.049)***	—

Bootstrap (1000) with 95% bias-corrected confidence interval: L = lower bound; U = upper bound; *p-value <0.05; **p-value <0.01; ***p-value >0.05.

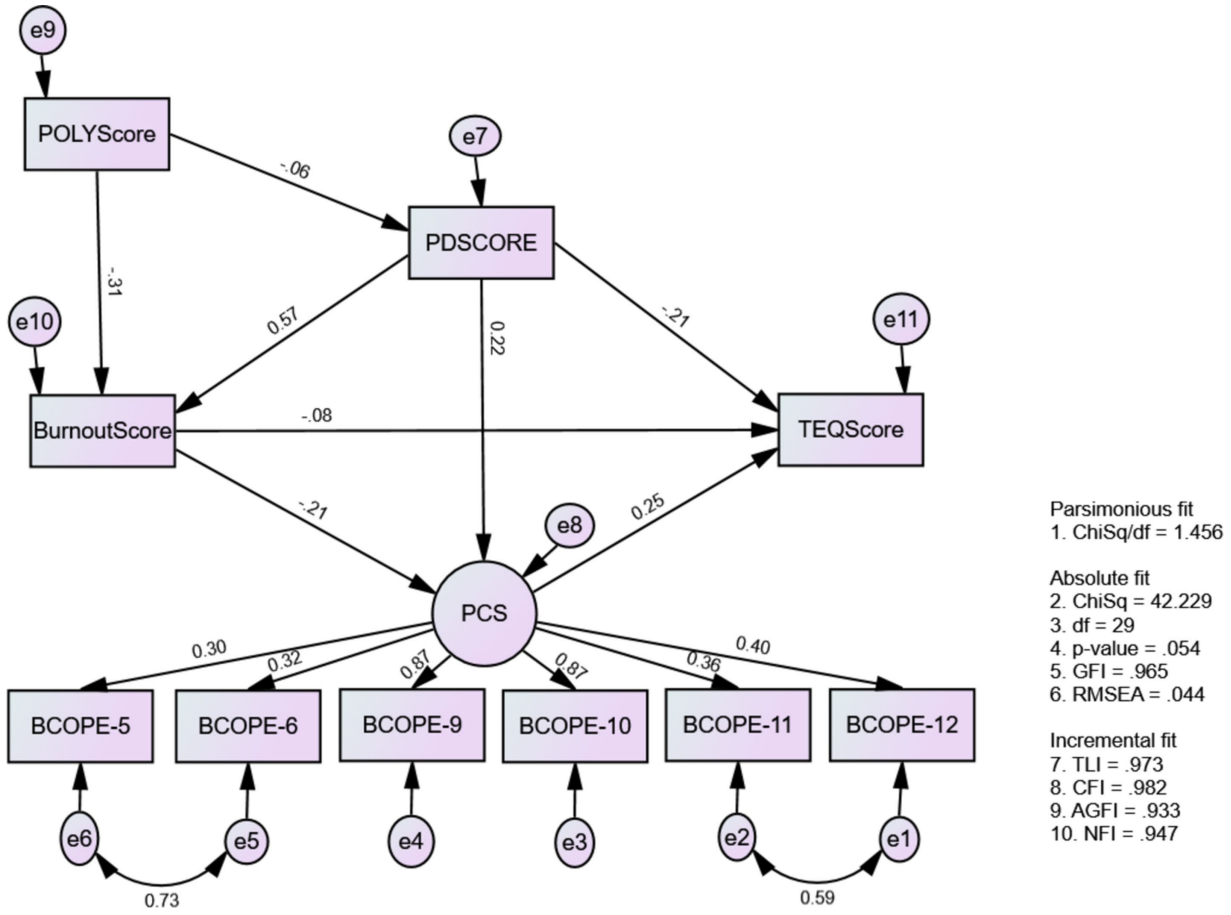

FIGURE 4
The causal-effect relationship model among mental well-being issues, positive coping strategy, and medical professionalism (Model 3: MWBi-PCS-MP).

among residents, while research in Romania (38) found a significant burnout rate among medical students, particularly during the pandemic. Our findings align with global observations that burnout tends to influence coping strategies, with positive coping methods being more frequently utilized than negative ones in response to burnout, as observed in Singapore (39), the USA (40), Qatar (41), and Saudi Arabia

TABLE 10 The estimates of standardized and unstandardized regression weights of variables for Model 3.

Endogenous variables		β	B	SE	p-values
Burnout (BurnoutScore)	Empathy (TEQScore)	−0.083	−0.064	0.059	0.281
	Positve coping strategy (PCS)	−0.207	−0.007	0.003	0.024
Psychological distress (PDScore)	Empathy (TEQScore)	−0.214	−0.341	0.123	0.006
	Positive coping strategy (PCS)	0.216	0.016	0.007	0.019
Positive coping strategy (PCS)	Empathy (TEQScore)	0.253	5.476	1.706	0.001

β = standardized regression weights; B = unstandardized regression weights; SE = standard error. Estimates for PDScore → BurnoutScore, PolyScore → PDScore, PolyScore → BurnoutScore remain the same as in Table 9, hence not included here.

TABLE 11 The unstandardized and standardized estimates of direct, indirect, and total effects for variables relationships for Model 3.

Parameter	Variables relationship		Total (95% CI)	Direct (95% CI)	Indirect (95% CI)
Unstandardized	PolyScore	PDScore	−0.025 (−0.078, 0.034)***	−0.025 (−0.078, 0.034)***	—
	PolyScore	PCS	0.002 (0.000, 0.005)*	—	0.002 (0.000, 0.005)*
	PDScore		0.007 (−0.004, 0.019)***	0.016 (0.005, 0.033)**	−0.009 (−0.020–0.001)*
	BurnoutScore		−0.007 (−0.017, −0.001)*	−0.007 (−0.017, −0.001)*	—
	BurnoutScore	TEQScore	−0.105 (−0.248, 0.032)***	−0.064 (−0.187, 0.073)***	−0.041 (−0.101, −0.007)*
	PCS		5.476 (1.992, 10.451)**	5.476 (1.992, 10.451)**	—
Standardized	PolyScore	PDScore	−0.059 (−0.186, 0.076)***	−0.059 (−0.186, 0.076)***	—
	PolyScore	PCS	0.058 (−0.004, 0.129)***	—	0.058 (−0.004, 0.129)***
	PDScore		0.098 (−0.057, 0.236)***	0.216 (0.048, 0.385)**	−0.118 (−0.238, −0.012)*
	BurnoutScore		−0.207 (−0.399, −0.014)*	−0.207 (−0.399, −0.014)*	—
	BurnoutScore	TEQScore	−0.136 (−0.309, 0.049)***	−0.083 (−0.253, 0.098)***	−0.053 (−0.129, −0.008)*
	PCS		0.253 (0.102, 0.388)**	0.253 (0.102, 0.388)**	—

Bootstrap (1000) with 95% bias-corrected confidence interval: L = lower bound; U = upper bound; *p-value <0.05; **p-value <0.01; ***p-value >0.05. Estimates for PolyScore → BurnoutScore, PDScore → BurnoutScore, PolyScore → TEQScore, PDScore → TEQScore remain similar as in Table 10, hence not included here.

(42, 43). We postulate that maintaining a positive attitude in the face of adversity is crucial for medical students to mitigate adverse effects on their mental health and enhance their overall performance. Supporting this assumption, evidence from various studies suggests that promoting positive coping strategies among students can contribute significantly to their emotional well-being and academic success (44). The findings indicate the importance of fostering positive coping mechanisms within medical education to support students' mental health and academic performance. We recommend that medical schools integrate programs that promote positive coping strategies, which could have significant implications for improving the overall well-being and effectiveness of future healthcare professionals.

Our study reveals that psychological distress increases the use of positive coping strategies (PCSs) among medical students, which does. This finding resonates with existing literature that underscores the pivotal role of social support in safeguarding mental health across diverse populations, including medical students. Similar studies have highlighted the importance of social support in mitigating psychological distress and promoting positive coping mechanisms. For instance, research indicates that social support networks are crucial for medical students to manage stress effectively, as demonstrated in studies across various countries like China (45), Italy (46), Canada (47) and Australia (48). Conversely, inadequate support from family and friends has been linked to a higher risk of depression among medical students in the United States (49). We postulate that psychological distress may prompt medical students to actively seek out positive coping strategies, leveraging social support to enhance their mental resilience. This assumption is supported by literature emphasizing the beneficial effects of social support in reducing stress and improving coping mechanisms. Our findings highlight the critical role of fostering robust social support systems within medical education. We recommend that medical schools implement programs that strengthen social support networks and teach effective positive coping strategies, which could significantly enhance the mental well-being and academic success of medical students.

Our study highlights a substantial association between employing positive coping strategies (PCSs) and increasing the empathy levels of medical students, suggesting a positive correlation between coping and empathy. This finding is corroborated by previous research, such as that by Noda, Noda et al. (50), which also identified a link between coping mechanisms and empathy. Empathy, closely tied to coping and stress, inherently influences coping mechanisms that involve supportive activities or interactions with others (51). Furthermore, findings by Saha et al. (52) confirm a positive correlation between empathic self-efficacy and adaptive coping techniques, while noting a negative correlation with maladaptive coping strategies. We postulate that more empathetic medical students are inclined towards using positive coping strategies when faced with stressful situations or conflicts, as empathy promotes supportive and adaptive responses (51, 53). Supporting this assumption, the literature emphasizes the role of empathy in fostering positive coping behaviors. Our findings highlight the importance of fostering empathy among medical students to enhance their coping

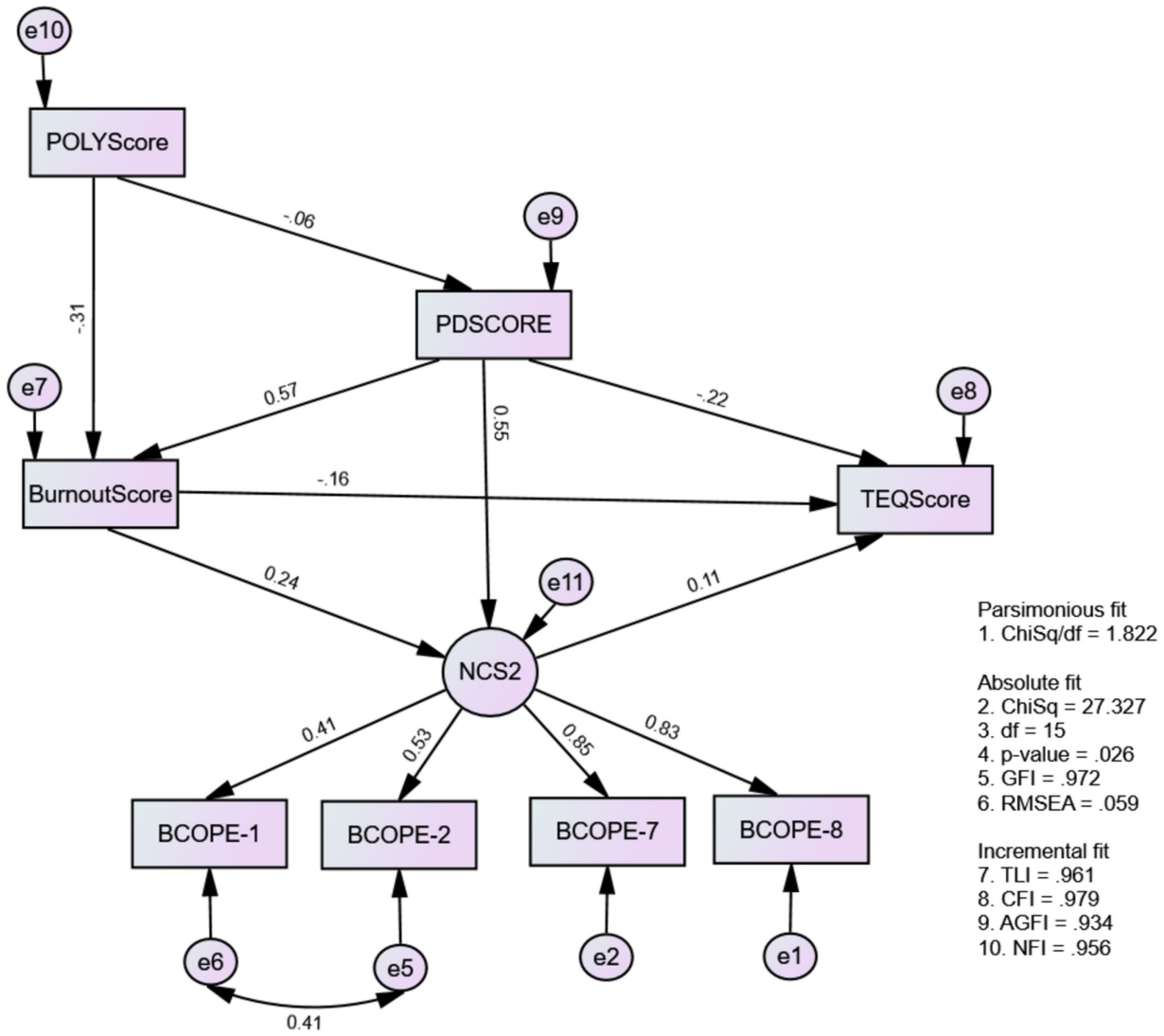

FIGURE 5
The causal-effect relationship model among mental wellbeing issues, negative coping strategy, and medical professionalism (Model 4: MWBi-NCS2-MP).

TABLE 12 The estimates of standardized and unstandardized regression weights of variables for Model 4.

Endogenous variables		*β*	*B*	SE	*p*-values
Burnout (BurnoutScore)	Negative coping strategy (NCS)	0.238	0.020	0.006	<0.001
	Empathy (TEQScore)	−0.157	−0.121	0.063	0.056
Psychological distress (PDScore)	Negative coping strategy (NCS)	548	0.094	0.012	< 0.001
	Empathy (TEQScore)	−0.207	−0.331	0.155	0.033
Negative coping strategy (NCS)	Empathy (TEQScore)	0.088	0.819	0.977	0.402

β = standardized regression weights; *B* = unstandardized regression weights; SE = standard error. Estimates for PDScore → BurnoutScore, PolyScore → PDScore, PolyScore → BurnoutScore remain the same as in Table 9, hence not included here.

skills and overall well-being. We recommend that medical education programs integrate empathy training to encourage the use of positive coping strategies, which could significantly improve students' mental health and professional performance.

Our study reveals a significant relationship between mental well-being issues and the adoption of negative coping strategies (NCSs) among medical students, particularly in response to burnout and psychological distress. This supports H4, and is consistent with earlier studies indicating that high levels of psychological distress, including depression, anxiety, and stress, positively correlate with the use of escape avoidance behaviors (54). Additionally, studies by Grynberg and López-Pérez (55) have similarly highlighted distress's positive

TABLE 13 The unstandardized and standardized estimates of direct, indirect, and total effects for variables relationships for Model 4.

Parameter	Variables relationship		Total (95% CI)	Direct (95% CI)	Indirect (95% CI)
Unstandardized	PolyScore	PDScore	−0.025 (−0.075, 0.031)***	−0.025 (−0.075, 0.031)***	—
	PolyScore	NCS	−0.008 (−0.016, −0.002)*	—	−0.008 (−0.016, −0.002)*
	PDScore		0.117 (0.094, 0.141)**	0.094 (0.069, 0.117)**	0.023 (0.009, 0.041)**
	Burnout Score		0.020 (0.007, 0.031)**	0.020 (0.007, 0.031)**	—
	Burnout Score	TEQScore	−0.105 (−0.252, 0.033)***	−0.121 (−0.263, 0.027)***	0.016 (−0.040, 0.068)***
	NCS		0.819 (−2.309, 2.710)***	0.819 (−2.309, 2.710)***	—
Standardized	PolyScore	PDScore	−0.059 (−0.179, 0.068)***	−0.059 (−0.179, 0.068)***	—
	PolyScore	NCS	−0.113 (−0.217, −0.022)*	—	−0.113 (−0.217, −0.022)*
	PDScore		0.683 (0.593, 0.772)**	0.548 (0.409, 0.661)**	0.135 (0.051.215)**
	Burnout Score		0.238 (0.085, 0.365)**	0.238 (0.085, 0.365)**	—
	Burnout Score	TEQScore	−0.136 (−0.322, 0.043)***	−0.157 (−0.342, 0.033)***	0.021 (−0.049, 0.086)***
	NCS		0.088 (−0.231, 0.295)***	0.088 (−0.231, 0.295)***	—

Bootstrap (1000) with 95% bias-corrected confidence interval: L = lower bound; U = upper bound; *p-value <0.05; **p-value <0.01; ***p-value >0.05. Estimates for POLY Score → Burnout Score, PDScore → Burnout Score, PolyScore → TEQScore, PDScore → TEQScore remain similar as in Table 10, hence not included here.

association with less healthy coping methods. We postulate that medical students experiencing mental well-being issues may resort to negative coping strategies as a means of escaping or avoiding stressful situations. This assumption is supported by literature emphasizing the detrimental impact of psychological distress on coping mechanisms, leading individuals to adopt maladaptive strategies in an attempt to cope with their emotions. Our findings highlight the importance of addressing mental well-being issues among medical students to mitigate the adoption of negative coping strategies. We recommend introducing extensive psychological and mental health support initiatives in medical education institutions to promote positive coping mechanisms and enhance overall student well-being. Such initiatives could have significant implications for improving the mental health and resilience of future health professionals, ultimately benefiting both students and the patients they serve.

Our study highlights a significant decrease in the empathy levels of medical students due to the direct and mediated effects of psychological distress. This finding aligns with previous research indicating that stress in medical practice can diminish empathy and overall performance quality (56). Similarly, Bellini et al. (57) found a negative correlation between distress, depression, and empathic concern. We postulate that anxiety, a component of psychological distress, may influence empathy due to heightened emotional sensitivity (58). Understanding this complex relationship between psychological functioning and empathy is crucial for medical students, as empathy fosters compassion and supportive care. Despite variations in research findings, empathy remains integral to positive social interactions and effective patient care. Our findings highlight the importance of addressing psychological distress among medical students to preserve empathy levels and enhance overall patient care. We recommend implementing interventions that promote mental well-being and resilience within medical education to safeguard empathy and improve health outcomes. Such initiatives could have significant implications for both medical students and the patients they serve, ultimately contributing to a more compassionate and effective healthcare system.

This study collectively presents some limitations that necessitate attention. Firstly, the reliance on self-reported data introduces potential biases, as participants' experiences and behaviors may be overreported or overlooked due to social desirability or recall bias. Secondly, the cross-sectional design of these studies limits the ability to draw causal inferences between variables, as we cannot definitively establish the directionality of the relationships observed. Additionally, the diverse cultural and educational contexts in which the work was conducted may negatively influence the generalizability of the findings. The work also did not account for all potentially confounding variables that could impact the relationships between psychological distress, coping strategies, empathy, and professional behavior. Authors feel there is need for further longitudinal and multi-site research to confirm and expand upon these results.

This study presents several notable strengths that enhance their contribution to understanding the mental health and professional behavior of medical students. Firstly, they address a critical and timely issue by exploring the multifaceted impact of psychological distress, burnout, and coping strategies on empathy and professionalism in medical education. The use of established and validated measures for assessing psychological distress, coping strategies, empathy, and professional behavior ensures the reliability and validity of the data collected. Additionally, the integration of both direct and mediated effects in the analyses provides a comprehensive understanding of the complex relationships among these variables. The findings are consistently aligned with existing literature, further validating the results and highlighting the global relevance of promoting mental well-being and positive coping mechanisms in medical education. These insights underscore the importance of fostering a supportive environment for medical students, which has significant implications for improving their mental health, empathy, and overall professional performance.

Based on the findings, several key recommendations and implications emerge for enhancing the mental well-being and professional development of medical students. It is crucial to integrate wide-ranging mental health backing plans within medical education to address psychological distress, thereby reducing the adoption of negative coping strategies and preserving empathy levels. The promotion of professional behavior should be emphasized as it indirectly mitigates burnout and enhances empathy and positive coping strategies. Medical curricula should incorporate training that fosters empathy, resilience, and positive coping mechanisms, which are vital for managing stress and

improving patient care. Additionally, fostering robust social support networks among medical students can significantly enhance their coping skills and overall well-being. These interventions not only improve the mental health and professional behavior of medical students but also have far-reaching implications for patient care and the healthcare system. By implementing these recommendations, medical schools can better prepare students to face the challenges of their profession, leading to more compassionate and effective healthcare professionals.

Conclusion

Mental wellness issues significantly impact medical students' health, learning, and patient care abilities. Stress, anxiety, depression, and burnout harm empathy and professionalism. While students often use PCSs, NCSs are also not uncommon and exacerbate challenges. Recognizing and addressing these difficulties with tailored support and training is crucial. Ensuring students' quality of life and teaching effective coping mechanisms are essential for their future roles in patient care and societal contributions.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by JEPeM-University Sains Malaysia, Health Campus, Kelantan, Kota Bharu. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

KS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. SM: Visualization, Writing – review & editing, Funding acquisition. MY: Visualization, Writing – review & editing, Conceptualization, Formal analysis, Methodology, Project administration, Supervision, Validation.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmed.2024.1468654/full#supplementary-material

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EDITED BY
Kate Owen,
University of Warwick, United Kingdom

REVIEWED BY
Ayesha Rauf,
National University of Medical Sciences, Pakistan
Nadia Shabnam,
National University of Medical sciences Rawalpindi, Pakistan

*CORRESPONDENCE:
Shaista Salman Guraya
✉ shaista.salman@dubaihealth.ae

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"Busting the hidden curriculum" a realist and innovative perspective to foster professional behaviors

Shaista Salman Guraya[1]*, Grainne P. Kearney[2], Frank Doyle[3], Asil Sadeq[4], Abdelsalam Bensaaud[4], Eric Clarke[4], Mark Harbinson[2], Aine Ryan[4], Mary Smyth[4], Sinead Hand[4], Fiona Boland[5], Salman Yousuf Guraya[6] and Denis W. Harkin[4]

[1]Institute of Learning, Mohammad Bin Rashid University of Medicine and Health Sciences, Dubai, United Arab Emirates, [2]School of Medicine, Dentistry and Biomedical Sciences, Queens University Belfast, Belfast, United Kingdom, [3]Department of Health Psychology, School of Population Health, RCSI University of Medicine and Health Sciences, Dublin, Ireland, [4]Centre for Professionalism in Medicine and Health Sciences, Faculty of Medicine and Health Sciences, RCSI University of Medicine and Health Sciences, Dublin, Ireland, [5]Data Science Centre, School of Population Health, RCSI University of Medicine and Health Sciences, Dublin, Ireland, [6]Clinical Sciences Department, College of Medicine, University of Sharjah, Sharjah, United Arab Emirates

Contemporary health professions education has long delineated the desired attributes of medical professionalism in the form of standard curricula and their role in forming professional behaviors (PBs) among aspiring doctors. However, existing research has shown the contradictory and powerful role of hidden curriculum (HC) in negatively influencing medical students' PBs through unspoken or implicit academic, cultural, or social standards and practices. These contrasting messages of formal curricula and HC lead to discordance and incongruence in future healthcare professionals developing professional identity formation. There is little research on PB modifying educational strategies and their determinants that medical schools adopt to bust the impact of HC. Consequently, it is unclear how the right PBs can be influenced, entrenched, and inculcated in undergraduate medical students, especially in their early clinical placements. The lack of such insight highlights a critical gap in the literature, nudging educators to take a realist stance to deal with this problem. Behavior psychology stresses shaping medical students' values and beliefs as salient mediators that influence intentions to pursue future PBs. Curiosity prevails about what would guide the educational interventions to target this behavior change. To help understand this concept, we present our design-based innovative perspective about PROfessionalism in Partnership for Education Research (PROPER) shaped by pluralistic theoretical models in the context of two European medical schools with diverse medical students, highlighting its non-parochial and transferable nature.

KEYWORDS

hidden curriculum, professional behaviors, medical professionalism, design-based research, theory of planned behavior, mixed-methods study

1 Background and need for innovation

In delivering safe and high-quality patient care, there has been a notable realization of the importance of upholding professional standards. This has led to a call for the establishment of professional behaviors (PB) in future healthcare professionals (HCPs) through modern health professions education (HPE) (1). However, the current state of HPE not only falls short in responding to this call but also impedes progress toward the right direction in some ways.

Martimianaks et al. (2), highlighted the increasing recognition of a hidden curriculum in negatively influencing PBs and professional identity formation Haferty (3, 4), described this HC-driven phenomenon as a source of implicit messages, values, and norms conveyed to learners through informal deliberations. These subtle influences can significantly shape students' perceptions of their physician roles. This pervasive and often negative influence of HC on professional teaching in contemporary medical education is now increasingly being acknowledged (5–9).

The current state of formal curricula in HPE may explicitly outline professional expectations and competencies, while hidden ones may give conflicting messages or reinforce stereotypes and biases that negate these efforts (10, 11). For instance, in a qualitative study of medical students perceptions, Lempp and Seale (9) highlighted how senior clinicians' role modeling of hierarchical power dynamics and negative cultures in hospitals can inadvertently promote unprofessional behaviors or attitudes among medical students and doctors in training. Therefore, HPE programs realize it is incumbent upon them to act by incorporating explicit training on professionalism and HC into the formal curriculum (12). By integrating discussions on professionalism, ethical decision-making, and the impact of organizational culture into didactic sessions, workshops, and clinical skills training, educators can raise students' awareness of HC and may provide them with the knowledge and skills to navigate its complexities effectively (13).

However, there remains a need for fundamental changes to mitigate and counteract the impact of HC on medical professionalism (MP) by using multifaceted approaches at all levels of undergraduate medical education (9, 14, 15). Sheeran (16) reminds us that this requirement can only be met effectively using scientific methods with experimental studies to identify the exact mechanisms involved in behavioral change interventions. This includes a detailed examination of the behaviors and theories of behavioral change underpinning the educational intervention and the use of these behavioral change models to marshal cumulative factors. Behavioral change research primarily forces educators to look for who, what, when, where, and how they need to do differently to motivate learners to adopt, adapt or pursue certain behaviors. This starts with a detailed analysis of identified behaviors and highlights its relationship in the wider individual or social behavioral networks (17). This, in turn, leads to the identification of professional, financial, organizational, or regulatory factors and self, peers, supervisors, family, and social media actors, which may influence the behaviors in question (18).

At this point, there remains a curiosity about what would guide the educational interventions targeting behavior change. To help us understand, a theory can provide a logical relationship between various abstract concepts that explain the world around us (19). This can help educators develop interventions that may be applied to different situations and contexts to achieve learning outcomes and behavior change (20, 21). Nevertheless, it's crucial to note that merely identifying theoretical constructs will not serve as a magic bullet. Identification of behavioral change strategies (22, 23) to influence the identified theoretical constructs are the frequently missed pieces of the puzzle in the intervention design (12, 24). Reflecting on the fundamental "master question" in education research: *What should be taught to whom, when, and how?* we recognize that effective educational planning must address not only what and to whom but also how behavioral change strategies align with educational objectives (22, 23). Hence, the educational intervention should identify the behavior-predicting determinants (theoretical framework), behavior change strategy targeting those determinants, and the practical application keeping the target population in mind (22, 25). This alignment forms the foundation of design-based research (DBR) (26), an innovative approach that emphasizes designing, testing, and refining educational interventions in real-world settings. DBR's pluralistic nature supports crossing theoretical and methodological boundaries, integrating theories to explore the interactions between context and behavioral mechanisms in complex environments.

In an attempt to respond to the identified gaps and the call for the promotion of PBs in future HCPs, borrowing DBR principles, we have proposed an educational intervention entitled the PROfessionalism in Partnership for Education Research (PROPER) study. PROPER uses a four-step experimental design approach, namely: (1) specifying the PBs, (2) analyzing PBs, (3) designing the intervention, and (4) measuring the change in PBs. Additionally, we incorporate a realist perspective by identifying underlying causal mechanisms and exploring how they work under specific conditions. Through this realist perspective, we aim to understand what, how, for whom, and under what circumstances complex interventions function most effectively (27). In this perspective piece, we strive to describe our PROPER educational intervention and its theoretical framework to support HPE educators and faculty who are interested in using theory-driven approaches to target PBs in MP education.

2 The PROPER educational intervention

The PROPER study, funded by the Higher Education Authority, North–South Research Program, was designed to foster the development of PBs among early clinical undergraduate medical students. The intervention involved theory-driven workshops for students from two distinct educational contexts on the Island of Ireland: the Royal College of Surgeons in Ireland (RCSI) University of Medicine and Health Sciences in Dublin (Republic of Ireland) and Queen's University Belfast (QUB) in Belfast (United Kingdom). At RCSI, professionalism is taught as an explicit strand focused on personal and professional identity formation, while QUB integrates professionalism within the basic sciences curriculum, embedding it seamlessly rather than through a dedicated module. Importantly, all participating students were at a comparable stage in their training; either in pre-clinical education or newly entering clinical placements which ensured a similar level of cognitive maturity and understanding across both groups. This consistency provided a reliable foundation for evaluating the intervention's impact across different curricular approaches. We have reported the PROPER study using TIDiER framework (28) throughout our perspective paper (Appendix 1).

PROPER workshops were designed in such a way that they could be conducted both in-person and virtually. We conducted four 90-min structured workshops on themes relevant to the HC which were identified as important by expert consensus (nominal group process) (29, 30), involving experts in medical education and medical students. These themes were:

i) Maintaining confidentiality in the clinical practice.
ii) Raising concerns and whistle-blowing.

iii) Practicing self-care and wellbeing.
iv) Exercising cultural sensitivity.

Box 1 entails the objectives of one of the workshops which can be used for all the identified themes.

The PROPER intervention contained pre-workshop resources followed by a structured 90-min workshop as outlined in Figure 1.

3 Steps taken for development and implementation of innovation

The salient feature of the intervention entailed identifying the desired behavior, behavioral analysis, intervention as a means of finding a mechanism to achieve the target behavior, and the perceived outcome of measuring the expected change in PBs (Figure 2).

3.1 Step 1: Specify the behavior – what do we want the students to do?

The influence of HC on the PBs of undergraduate medical students was the driving force. In the realm of HC, Haferty has proposed various areas that need to be safeguarded (3, 4). However, keeping the clinical context of participating institutions in mind, we identified four essential areas for PBs: maintaining confidentiality, exercising cultural sensitivity, practicing self-care, and raising concerns. To do that, we employed the nominal group process approach (29, 30), which is an expert panel method to reach a consensus on the most important PBs to address within HC in our PROPER study. This method is being used across multiple fields, particularly in healthcare research and intervention, and benefits from true expert opinion and time efficiency. A group of 8 subject-matter medical educators, practicing physicians, experts, and an educational psychologist individually proposed themes and then facilitated group discussions through a series of moderation. DWH ranked and agreed on priorities for the educational intervention. Iterative and thorough deliberations and discussions among research team members also helped us to finalize the scenarios for these aspects to be used in the PROPER.

3.2 Step 2: Behavioral analysis – what will it take to do that?

Later, we worked on the hypothesis of what would guide behavioral analysis. A growing body of literature indicates that utilizing behavioral theories can aid in pinpointing modifiable factors that can assist HCPs in modifying their behaviors to align with evidence-based healthcare practices. In shaping the educational interventions aimed at enhancing PBs among undergraduate medical students, it was imperative to anchor the approach within a robust theoretical framework (31). We looked for the available theories regarding behavior and behavior change to achieve a theory-driven approach to modifying PB. Davis et al. (32), have reported 82 behaviors and behavioral change theories, which can help outline modifiable factors that can assist HCPs in modifying their behaviors to align with desired healthcare practices.

Box 1 Workshop objectives (DAGaRR).

1. **Define** the terms and features associated with the concept of confidentiality at an abstract level and concrete, i.e., behavioral level.
2. **Acquire experience** in defining and articulating professional and unprofessional behaviors by describing various behaviors related to a common set of experiences illustrated in the scenarios.
3. **Gain perspectives** on how the same experience can be perceived from multiple perspectives of other individuals on a team (e.g., student, resident, faculty, family, society and council, etc.).
4. **Recognize** behaviors in yourselves and others that can be categorized unprofessional when it comes to confidentiality.
5. **Reflect** on the workshop experience in terms of your behavior and the behavior of others related to confidentiality.

The PROPER study has focused on expectancy-value social cognition models that highlight the intentional, reflective factors of behavior through the theory of planned behavior (TPB) (33). TPB proposes that behavioral intentions are the most reliable predictor of behaviors, which are influenced by three main factors (1): attitudes toward the behavior, which are based on beliefs about the consequences of the behavior (2); subjective norms, which are rooted in beliefs about normative expectations of influential individuals); and (3) perceived behavioral controls which derive from beliefs about factors facilitating or hindering behavior. The strength of TPB lies in the explicit relationship of various conceptual constructs and their relationship in influencing behaviors (34, 35). For instance, in the medical field, TPB suggests that an HCP's intention to engage in a specific behavior, such as adhering to clinical guidelines (36), disclosing medical errors (37) or intention to be professional in the digital world (24) is shaped by their beliefs about the behavior, social influences, and the perceived ability to enact the behavior.

Another important predominant theory that underpins the PROPER study is the social cognitive theory (SCT) by Bandura (12, 38) which underpins contemporary educational practices by emphasizing the role of observation, imitation, and interaction in the acquisition and reinforcement of behaviors (38). In the context of HPE, the SCT enacts that students learn not only from didactic instruction but also from observing role models, engaging in collaborative activities, and participating in group discussions (12). Self-efficacy (39), central to SCT, is acquired through socialization in the communities of practice leading to a situated cognitive enhancement (Figure 2). Godin and colleagues' systematic review has highlighted that TPB (33) and SCT (12, 38) have been the predominant focus for predicting HCPs' behaviors to date, with a focus on PBs (40). Informed by the published literature, the PROPER study supported the adoption of TPB and SCT as theories of our choice (41). Figure 3 describes the collective PROPER theoretical framework.

Using the TPB and SCT, we identified and signposted the modifiable factors that can be leveraged while designing interventions for behavioral changes (42). The identified four key areas were found to be occurring in a social setting, where each behavior is within the network of behaviors within each person and each person in turn within the network of other people. By adopting the behavioral analysis by Sheeran et al., we used a combination of TPB and SCT as shown in Figure 4, which illustrates the number of actors are playing their roles for Miss X's knowledge, cognition and self-efficacy. The PROPER study however, is targeted toward changing Miss X's behavior only.

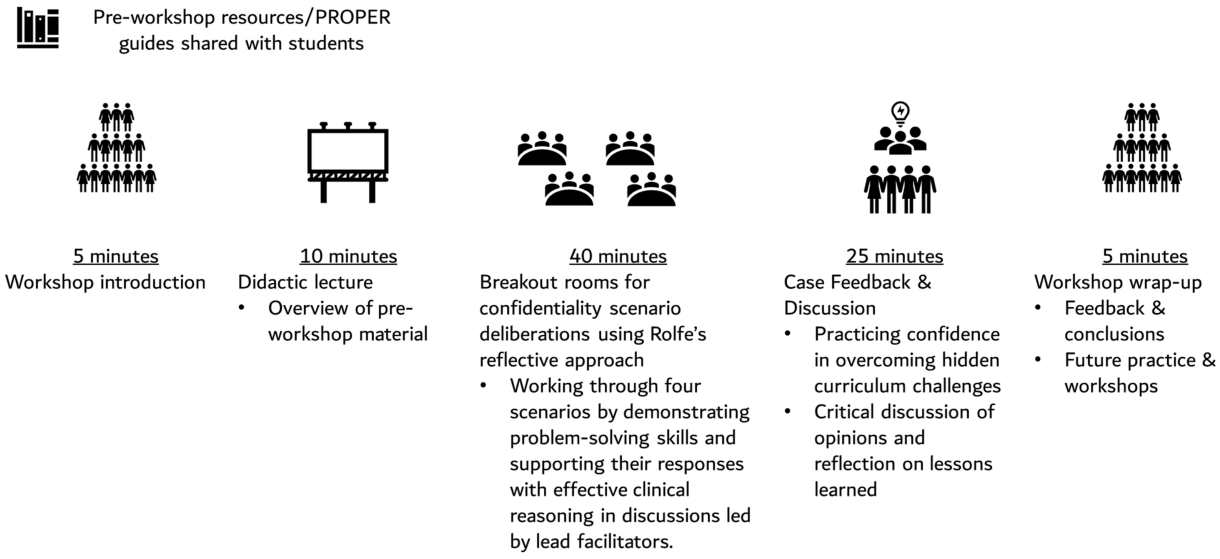

FIGURE 1
Detailed design and structure of the online PROPER intervention.

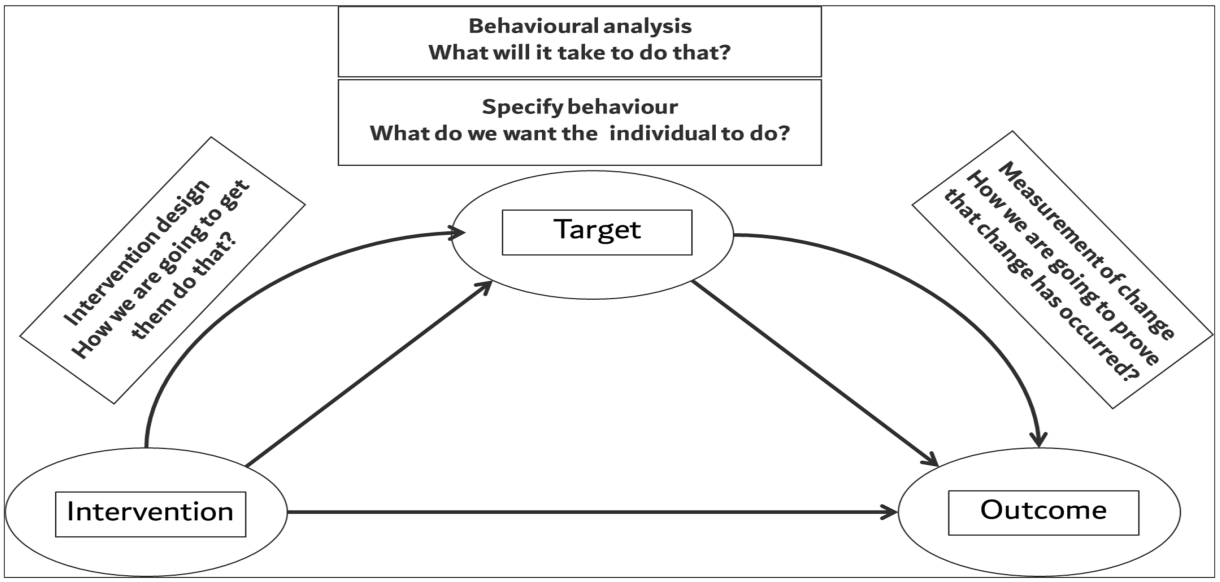

FIGURE 2
The intertwined relationship of the PROPER workshop target, educational intervention, and the outcome for measuring the changes in professional behaviors.

3.3 Step 3: Interventional design – how will we get them to do that?

In designing the PROPER intervention, we adopted a DBR approach (26), which emphasizes the iterative development and testing of educational interventions within real-world contexts. Informed by DBR approach, we employed a pluralistic use of theories and methodologies, which allowed us to cross theoretical and methodological boundaries to address the complexity of behavioral change in healthcare education. We thoughtfully curated a sequence of educational activities integrating the constructs of the TPB constructs within the social cognition framework and settings. However, it is important to note a significant critique highlighted by Hardeman et al. (23), TPB has often been limited to measuring process and outcome variables (such as intentions) without directly informing educational intervention design, a finding commonly seen in the published literature. In the context of HPE and MP, Archer (35), Geist (43), Shiphra (44) and Guraya et al. (24), have endorsed the use of TPB to design educational interventions but did not provide a clear roadmap. Recently, Medisauskaite et al. (45), and Rich et al. (36),

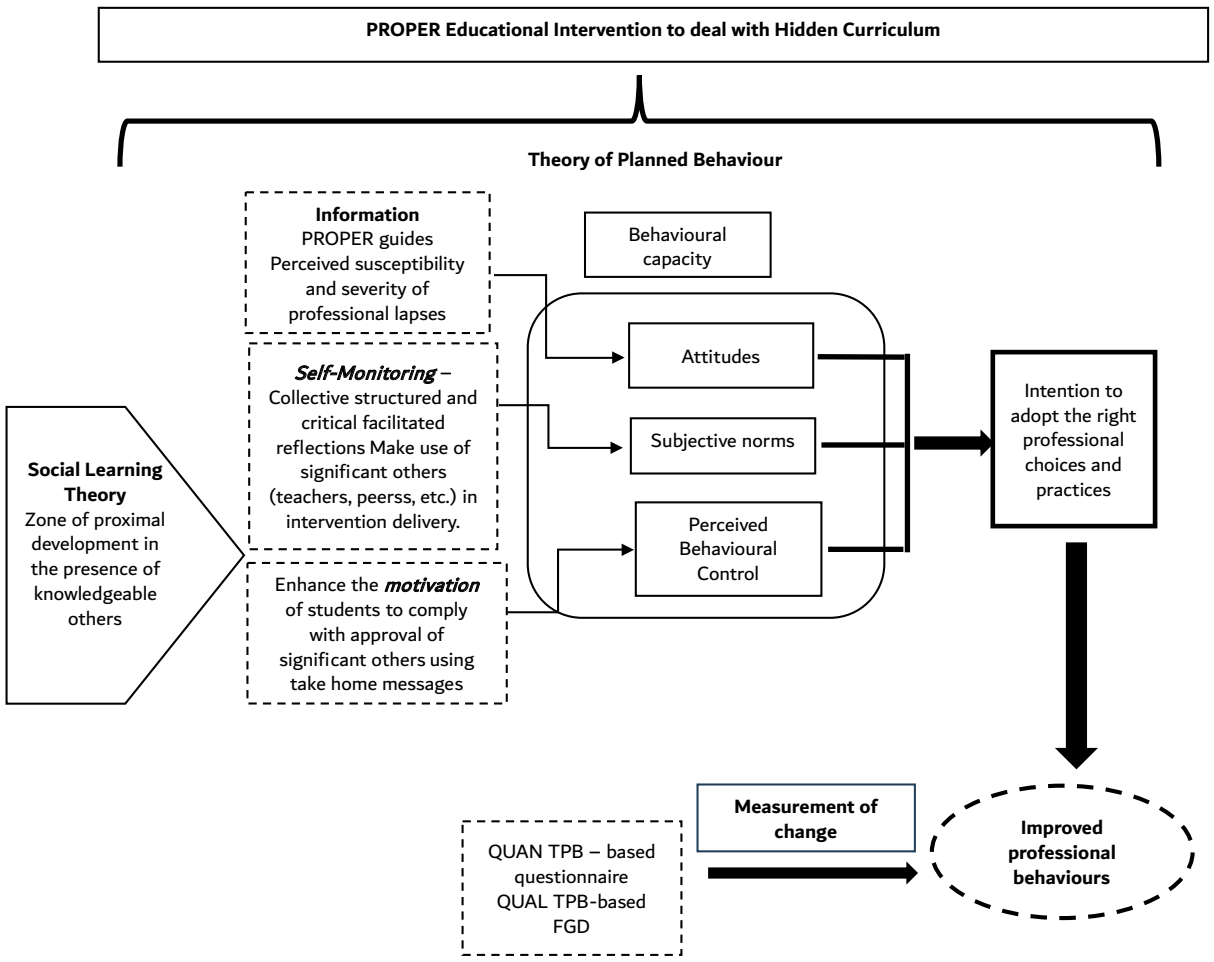

FIGURE 3
Theoretical Framework for Improving Professional Behavior Development in PROPER highlighting the interaction between the Social Learning Theory and Theory of Planned Behavior. PROPER: Professionalism in Partnership for Education Research Study; QUAN: Quantitative; QUAL; Qualitative; TPB: theory of planned behavior; FGD: Focus Group Discussion.

evaluated a professionalism-based United Kingdom program; however, the program's design was not embedded in theoretical underpinnings. Our DBR approach allowed us to address this limitation by combining TPB with behavioral change models. Drawing from Kok (22) and Hardeman et al. (23), we developed a taxonomy of strategies to increase behavioral capacity within the intervention. Specifically, *'Information'* was used to influence attitudes, *'self-affirmation'* to shape subjective norms, and *'motivation'* and *'role modeling'* to enhance perceived behavioral control. This DBR-guided design allowed us to move beyond traditional TPB applications, providing a structured yet adaptable roadmap for developing theory-driven educational interventions. The following sections elaborate on our chosen strategies in detail, explaining how each component of the intervention aligns with our goals for advancing PBs in healthcare.

3.3.1 'Information'—attitudes

Information has been used widely in various health behavior modification interventions (46). In our work, the modification of attitudes toward PBs was targeted using a multifaceted approach where participants understood the perceived susceptibility and severity of professional lapses. Our PROPER study utilized evidence-based information and case studies to highlight the potential consequences of unprofessional conduct, emphasizing the importance of upholding ethical standards in clinical practice. Regarding evidence-based information, resources in the form of PROPER study guides were developed collaboratively by HPE experts, clinicians and students within the PROPER study group. To ensure that guidance was appropriate, a subject expert reviewed and included universal principles while medical experts in clinical practice from the Republic of Ireland (Medical Council of Ireland) and United Kingdom (General Medical Council) reviewed and discussed areas where guidance protocols agreed or differed. These resources were named PROPER Guides and were shared with the participants before workshops. By offering accessible and relevant learning materials, the PROPER study equipped students with the knowledge and skills necessary to navigate complex professional scenarios effectively.

3.3.2 Self-affirmation' using guided reflection and facilitation—subjective norms

Self-affirmation (47) is about reflection on one's values, attributes and social relations and has been used to improve MP understanding in our recent research (12) and in improving health-related intentions

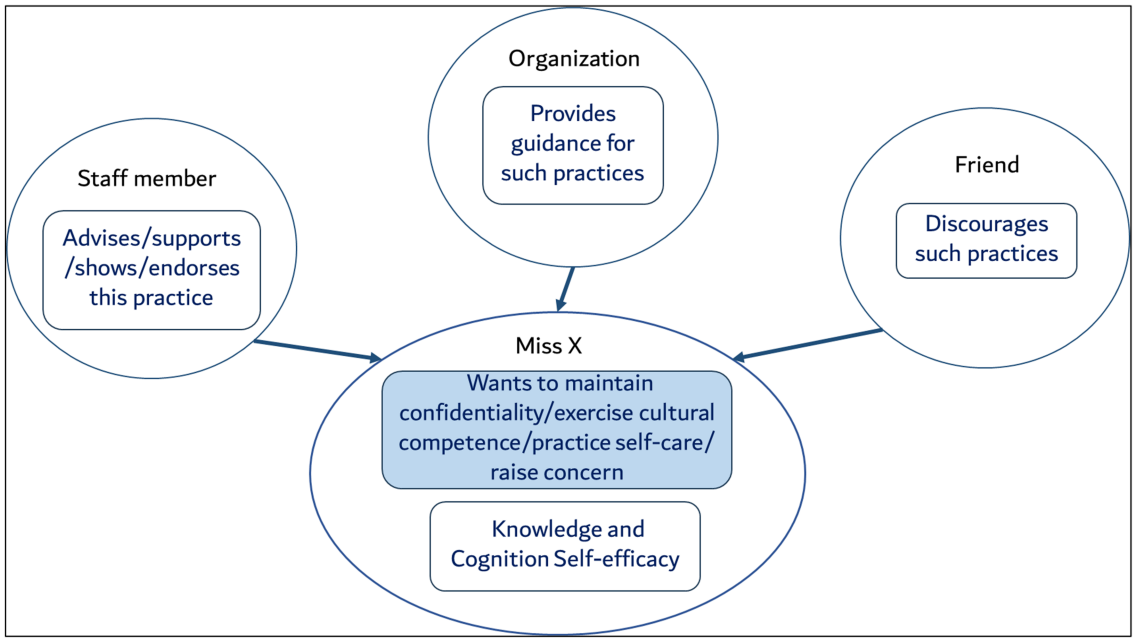

FIGURE 4
Influencing factors and actors for the behavioral analysis.

(47, 48). According to ancient Greek Philosophy the famous aphorism "know thyself" refers to the process of Reflection (49), which employs *'self-affirmation'* as a behavior change method as elucidated by Hardeman et al. (23). This concept influences SN by enhancing self-regulatory abilities, attentional bias, and judgmental confidence (50). In real-world settings, much of the applied knowledge is implicit and requires clarification and reinterpretation to advance medical practices. Reflection is recognized as a crucial skill for doctors, playing a vital role in fostering deeper and enduring learning, as well as facilitating patient-centered care during clinical interactions (51, 52). From a learning perspective, reflection serves to validate previous learning experiences or scrutinize the rationale behind our beliefs (53). Conceptually, there is a noticeable oversight in the theoretical discourse of collective reflective practice (54). In an interesting study, tackling wicked problems (55) regarding complex public health challenges, the researchers used collective reflective practices to gain an advantage from collaborative strategies for problem-solving, particularly through structured dialogs. Theoretical frameworks often adopt an individualistic perspective, failing to adequately address the collective aspect of reflective practice.

Contrary to Schön's theory, which portrays reflection primarily as a solitary endeavor we adopted a collective reflection, recognizing it as a social process occurring within a broader learning community (54). In our PROPER study, the participants focused on the HC using Rolf's reflective model (56, 57) for structured guided reflection (58). During the breakout room placements, firstly, students explored their own professional values and reflected on their personal experiences within healthcare settings and we used value clarification activities to support this introspective process. Secondly, students engaged in dialogs with external factors pertinent to their clinical environment, including policies, guidelines, and ethical considerations, while sharing and discussing their reflections with peers. Finally, students were encouraged to critically analyze the social theory context (micro, meso and macro levels) of healthcare, exploring how decisions and societal norms could influence current practices. Positive expectations were made available through guided and facilitated collective discussions and scenario analysis. Students gained insights into healthcare practices, fostering a deeper understanding of HC and its impact on PB and insights into others' approvals.

3.3.3 Motivation' and role-modeling'—perceived behavioral control

In the realm of behavior change, educational intervention might aim to increase self-efficacy beliefs to resist social pressure and choose an unprofessional course of conduct. Such belief in one's ability to enact a PB is enhanced by applying theory-based methods such as role-modeling, guided reflective practice with feedback, and reinforcement by expert facilitators. This interactive approach hinged on Bandura's SCT (39, 58), enhanced the PROPER students' self-efficacy and PBC by equipping them with the skills and insights necessary to navigate complex ethical challenges in clinical practice. In the PROPER workshops, we encouraged the participants to understand take-home messages by examining the factors influencing their decisions and actions by developing a deeper awareness of their motivations and intentions. Large group wrap-ups and key take-home messages strengthened the participants' hypothetical intentions for performing the right PBs, indicating their ability to overcome cognitive dissonance in future clinical placements. It's imperative to highlight the role of practicing physicians as facilitators (DWH, SYG, SSG, GPK, and MH) to showcase an authentic and impactful learning experience for the participants. By providing such organized and structured reflective practices, vicarious experiences, and venues

where rationalization and moral justifications of everyday situations were discussed collectively, facilitated by HCPs modeling the right choices had the potential to influence the strength of self-efficacy leading to a change in actions (12, 59).

3.4 Step 4: Measurement of change - how will we prove that change has occurred?

A comprehensive theory-informed approach was employed to assess the impact of PROPER study. Evaluative designs based on the TPB have been used by Guraya et al. (24), Medisauskaite et al. (45), and Rich et al. (36), however, only the first two studies (24, 45) used a mixed-methods approach, while Rich et al. (36), applied only quantitative measures. Although the methodological design varied significantly in all three studies, Guraya et al. (24), and Rich et al. (36), capitalized on pre-post design. For the PROPER study, we followed the quasi-experimental without randomization design modeled by Medisauskaite et al. (45), with self-reported pre-post, and delayed post-measurements within the intervention and control group. To further enhance the explanatory power of our approach, we conducted TPB-based FGDs to understand the causal-effect relationships and capture participants' insights on behavioral changes (24, 60).

While these data sources provide a nuanced understanding of the intervention's effects on professional development, we recognize that behavioral change, especially in healthcare, often requires time and sustained effort (42). Measuring outcomes shortly after the intervention may not fully capture the persistence or gradual adoption of new behaviors. Future follow-up assessments could be beneficial in evaluating the long-term impact of the intervention. Additionally, we prioritized validity by validating our TPB-based questionnaire, as reported in a recent publication (61). Finally, it is pertinent to note that while SCT informed the learning and workshop design, only TPB constructs were employed in analyzing behavioral change, ensuring a focused and reliable evaluation.

4 Critical reflection

Our previous research work shaped our perspective (24) in the field of MP in the context of undergraduate medical education and we built on our understanding of behavioral change theories (32). In reflecting on the "master question" in education research; *What should be taught to whom, when and how?*, we recognized that effective educational planning must address not only what and to whom but also how behavioral change strategies are mapped onto educational objectives (22, 23). This perspective highlights the complexities of developing, designing, and implementing contextually appropriate educational research. This aligns with the principles of DBR, where educational interventions function as sites for systematically studying and refining learning phenomena and where the complexity of these settings gives rise to emergent insights (26).

In this light, the PROPER study is informed by design-based research. It operates within a robust theoretical framework, drawing from both Bandura's SCT and TPB, to enhance behavioral capacity in HPE. Nevertheless, we recognize that learning cannot be fully addressed using a few theoretical frameworks or methodological approaches. Acknowledging that SCT and TPB focus on personal and social influences, we realize that broader contextual factors such as organizational support, policies, and time constraints play a significant role in healthcare settings. We encourage our HPE community to address these systemic factors in future iterations, which could expand the intervention's relevance and predictive power.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author/s.

Ethics statement

The studies involving humans were approved by Ethical approval was sought and obtained from the Research Ethics Committee (REC) of the RCSI (REC202301006) and QUB (MHLS 22_184). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

SSG: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. GK: Data curation, Investigation, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing. FD: Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AS: Formal analysis, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing. AB: Formal analysis, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing. EC: Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing. MH: Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing. AR: Investigation, Methodology, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing. MS: Investigation, Methodology, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing. SH: Investigation, Methodology, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing. FB: Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing. SYG: Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. DH: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmed.2024.1484058/full#supplementary-material

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Kamran Sattar,
King Saud University, Saudi Arabia

REVIEWED BY
Mona Hmoud AlSheikh,
Imam Abdulrahman Bin Faisal University, Saudi Arabia
Ziqi Zhou,
Sichuan University, China

*CORRESPONDENCE
Muhammad Zafar Iqbal
✉ ziqbal@acuityinsights.com

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Evaluating factors that impact scoring an open response situational judgment test: a mixed methods approach

Muhammad Zafar Iqbal*, Rodica Ivan, Colleen Robb and Jillian Derby

Research Department, Acuity Insights, Toronto, ON, Canada

Introduction: Situational judgment tests (SJT) are commonly used in admissions to measure skills associated with professionalism. Although open-response SJTs have shown strong psychometric properties, assessors' personal beliefs, experiences, and cultural backgrounds may influence how they perceive, organize and evaluate information within test takers' diverse responses. Additionally, SJT research typically focuses on reliability and predictive validity, whereas the construct validity of open response SJTs remains underexplored. This mixed methods study aims to address this gap by exploring the construct-(ir)relevant factors that may impact assessors' evaluation of professionalism in open response SJTs.

Methods: For this study, we used data from Casper, an open response SJT commonly used in professional program admissions. In Study I, a quantitative content analysis was conducted on 160 responses to identify factors which were significant predictors of low and high scores. Correlation coefficients and logistic regression models were used to evaluate the relationship between each factor and response scores. In Study II, think-aloud activities were conducted with 23 Casper assessors to directly observe how they evaluated responses. All interviews were transcribed verbatim, which were then thematically analyzed using an inductive coding technique.

Results: Results from both the content analyses and think-aloud activities revealed that several construct relevant factors influenced scores. Scores were impacted by the extent to which test takers demonstrated the competencies probed for by the SJT, engaged with the context of the presented ethical dilemma, provided in-depth justifications for their response, considered various perspectives relevant to the presented dilemma, and provided creative solutions or insightful arguments for the suggested approach. Mixed results were found with respect to construct irrelevant factors, such as the flow, cohesion, and kinds of phrases used in the response.

Conclusion: This mixed methods study contributes to the construct validity of SJTs by investigating construct relevant and irrelevant factors that may impact assessors' evaluation of open responses. The findings of this study provide evidence that open-response SJTs are valid approaches to measure professional competencies more broadly, both in terms of *what* test takers focus on in their responses, as well as in terms of *how* they construct their responses.

KEYWORDS

situational judgment tests, open response scoring, construct validity, professionalism, personal skills, professional skills, admissions

1 Introduction

Situational judgment tests (SJT) are typically used to measure skills associated with professionalism by evaluating one's responses to a variety of hypothetical scenarios that professionals would likely encounter in their roles or everyday life (1–3). Over the years, higher education programs have been increasingly integrating SJTs into their admissions process alongside traditional academic measures (e.g., GPA) across different professions, including medicine (4–7), healthcare (8, 9), and teacher's education (10, 11). Historically, higher education programs relied on reference letters, personal statements, interviews, and/or multiple mini interviews (MMIs) to assess applicants' personal and professional skills. Unfortunately, studies suggest that reference letters and personal statements have poor reliability and predictive validity (5, 12, 13). More recent concerns include the authenticity of such documents, given that letters written by artificial intelligence tools (i.e., ChatGPT) may sometimes be indistinguishable from those written by humans (14, 15). Alternatively, although interviews and MMIs are reliable and valid (16), they are also time and resource intensive for programs and applicants (9, 17). In the context of the limitations of these traditional measures, SJTs have emerged to be a cost effective and psychometrically sound method for assessing applicants' professionalism early in the admissions process (5, 6).

While SJTs may share similar theoretical frameworks (2), there are unique test design elements that can have a notable impact on the measured construct(s) and on the quality of the test results (18, 19). We discuss two of these elements here: the response format and the question type. Typically, SJTs have either a fixed-response or an open-response format (and sometimes a combination of both). Fixed-response formats (e.g., multiple choice) require test takers to rate, rank, or select a response from a set of predetermined options, whereas open-response formats allow test takers to formulate their own responses by describing their approach and providing a rationale unique to them, their experience, and their interpretation of the presented situation (20, 21). Another key design difference in SJTs is the question type. Knowledge type questions, more commonly used in fixed-response SJTs, ask test takers to determine the extent to which the provided options would be effective in a specific scenario, inherently measuring one's knowledge (22). Alternatively, behavioral tendency questions, more commonly used in open-response SJTs, ask test takers to express how they would likely react in response to the presented situation, thus measuring non-technical constructs like behaviors and traits associated with professionalism (22, 23).

When comparing the qualities of fixed-response and open-response SJTs, fixed-response formats have shown to produce larger demographic group differences (21); to be more vulnerable to fake or deceptive responses (15, 24, 25); and have revealed weaker predictive validity (26–28). In the context of medical school admissions, open-response SJTs measuring social intelligence and professionalism have evidenced correlations with interview performance ranging from $r = 0.11$ to $r = 0.48$ (27, 28), while fixed-response SJTs measuring similar constructs have evidenced relatively lower correlations ranging from $r = 0.09$ to $r = 0.11$ (26).

While open-response SJTs might be associated with relatively stronger psychometric properties, they are also inherently subject to more variability in the response content, and consequently more variability in how these responses are assessed. Open-response tests not only allow test takers to provide diverse and complex responses, they also offer more nuance in how assessors interpret and evaluate these individual responses against the provided scoring criteria (29–31). In a study investigating how assessors mark student essays, Hasan and Jones used think-aloud interviews to explore the scoring process and found that assessors would often rely on norm referencing (comparing essays to each other) even when instructed to closely follow scoring guidelines (31). Moreover, assessors' personal beliefs, experiences, and cultural backgrounds may influence how they perceive, organize and evaluate information within responses and can sometimes lead to inconsistent or biased scoring (30, 32, 33). For instance, Condor found that construct-irrelevant factors such as response length, language, and phrase frequency can predict human assigned scores even for cognitive mathematics tests using open responses (34). Additionally, Mello et al. (35) argue that scoring open-ended responses is time-consuming, which might lead assessors to superficially screen responses and not fully consider applicants' abilities. Other assessor related biases such as the halo effect (an applicant's first impression influencing an assessor's subsequent judgments) and leniency or severity bias (assessors consistently scoring higher or lower than average) have also been reported in the literature (33, 36). Given that this variability can undermine the reliability and fairness of SJT scores, it is vital that we understand the cognitive processes of assessors. It is important to highlight, however, that scoring can be quite complex for open-response and fixed-response SJTs alike. By design, SJTs present test takers with situations where several answers are plausible and/or appropriate. Since there is no definitive correct answer in either SJT format, fixed-response SJTs may employ several possible methods (i.e., empirical, expert-based, etc.) to score each response option, and thus impact the validity of the test (37), its reliability (38), as well as the measured construct (23).

Although both the response format (open/fixed) and the scoring process have been argued to affect the measured construct (19, 23), SJT research has primarily focused on (i) fixed-response SJTs, and (ii) quantitative psychometric properties, especially reliability and predictive validity evidence – that is – the relationship between SJT scores and future performance (6, 39). In fact, some scholars have claimed that the research focus on the relationship between SJT scores and other metrics (e.g., grades, interviews) has led to a lack of clarity in terms of the actual construct that SJTs are intended to measure (19, 40), which highlights the need for more in-depth construct validity research (19, 41). To address the literature gap on *how* SJTs measure their intended construct, Wolcott et al. (42) used think-aloud interviews to probe further into factors that impact test takers' response process in a *fixed-response* SJT. In this study, we further address this gap by considering an entirely different piece of the puzzle, namely the factors that impact assessors' scoring process in an *open-response* SJT. While SJTs often employ scoring guidelines to enhance score reliability and inter-rater agreement, assessors might nevertheless consider additional response attributes when deciding which scores to assign (30–32). Thus, we narrow in on the following research question: *which construct-(ir)relevant factors play a role in assessors' evaluation of test takers' unique answers to open-response SJT scenarios?*

To explore this research question, the Casper SJT was used, an open-response SJT that assesses the social intelligence and professionalism of those applying to a variety of professional

programs (e.g., medicine, engineering, teacher's education, health sciences, business, etc.). The Casper test comprises hypothetical scenarios designed to assess a combination of multiple personal and professional competencies including empathy, communication, motivation, resilience, self-awareness, problem-solving, collaboration, ethics, equity, and professionalism (43). These scenarios are presented to test-takers as either a text prompt (i.e., a short written description of a situation) or a video prompt (i.e., trained actors performing a situation). Test takers are required to respond to the scenario questions in two unique ways: either typing out their response or verbalizing their response via audio-visual recording. Responses are then scored by trained human assessors on a scale of 1 to 9. While assessors are provided with scoring guidelines specific for each scenario, scoring is also norm-referenced (i.e., responses are scored relative to other responses to the same scenario within the same test sitting). The scoring guidelines provide assessors with (1) a set of guiding questions to help them determine the extent to which the responses effectively answered the questions posed in the scenario and (2) detailed context on how the scenario relates to Casper competencies. Importantly, Casper was also selected because it demonstrates high reliability and validity ($\alpha = 0.82$, test–retest reliability y = 0.75) (44), indicating that the items of the test work together to measure the same construct (45). Additionally, Casper has been shown to predict future performance on similar measures such as interview performance with correlations ranging from $r = 0.11$ to $r = 0.48$ (27, 28, 44).

Casper, with its open-response format and use of behavioral tendency questions, produces large pieces of text data which are then evaluated by human assessors. Although Casper has continuously demonstrated strong psychometric qualities (46), it is unclear what additional response attributes assessors consider during the scoring process (30, 31). By nature of its design, Casper provides optimal data for examining which construct-(ir)relevant factors may impact assessors' evaluation of test takers' unique answers to open-response SJT questions.

Given the complexity of this task, we employed a mixed-methods approach. First, we conducted a quantitative content analysis of test takers' Casper responses to identify potential factors and response characteristics that might impact scoring (Study I). Then, in line with Hasan and Jones (31) and Wolcott et al. (42), we used *think-aloud interviews* to observe participants' process and delve deeper into their decision making (Study II). While in Study I we focused on the content of test takers' responses, in Study II we directly observed how assessors interacted with this content as they evaluated responses against scoring guidelines. Together, these findings shed more light on the implicit factors that play a role in assessing open-response SJTs, contribute to construct validity research on SJTs, and help enhance the transparency of SJTs more broadly.

2 Study I: quantitative content analysis

The primary aim of this study was to delve deeper into the content of test takers' responses to Casper items and identify which response characteristics might play a role in scoring. Given the variability in response content and response assessment of open-response SJTs discussed above, we hypothesized that construct relevant and construct irrelevant factors alike impact a response's score. Therefore, we expected that both types of factors would correlate with scores and predict low (1–3) and high (7–9) Casper scores.

2.1 Method

The open-response format of the Casper test results in large pieces of text data; therefore, we chose to conduct a content analysis because of its ability to dissect and identify granular response characteristics and apply a quantitative approach to aid in interpretation (47, 48). At its core, content analysis is a process by which large pieces of information are segmented into unique categories (i.e., factors) using coding rules which are guided by theory and/or previous findings (47, 49).

2.2 Procedure

We used a robust checklist for content analysis, which was developed by two researchers (RI and CR) who performed a thematic analysis of historical Casper data (i.e., 60 test takers responses) using an emergent approach. As outlined by Stemler (49), an emergent approach to checklist creation is an iterative process in which researchers review a set of data, identify factors for the checklist, reconcile differences, and edit accordingly. After developing the codes, we conducted multiple discussion rounds in which all four researchers went through all codes one by one, discussed their feasibility and voted for their inclusion and exclusion. In cases when a code was important but not clear, we reworded it to improve its clarity and applicability. Only those codes were kept in the checklist that received at least three out of four votes. Once the codes were finalized, two researchers (RI and CR) developed their definitions, and the other two researchers (MZI and JD) provided constructive feedback on the wording. Afterwards, consensus on the definitions of all codes was developed synchronously in a team discussion meeting.

Based on this historical data, we identified 13 different factors (see Table 1), nine of which were construct relevant and either related to information provided in the scoring guidelines (*Addressed competencies targeted in the scenario*, *Considered context of the scenario*) or they were common construct relevant characteristics of responses which are not directly referenced in the scoring guidelines (provided justification, consideration of other perspectives). The construct irrelevant factors we identified in the responses pertained to linguistic considerations or to applicant appearance (for the video responses). One of these construct irrelevant factors, *Used phrases suggested by third party training materials,* was inspired by online unofficial sources (unaffiliated with Casper) which recommend using particular phrases, e.g., "I would approach my colleague in a non-confrontational manner in a private setting."

2.3 Materials

To ensure a representative sample, the data selection process was as follows.

TABLE 1 Checklist: emergent factors from the thematic analysis of historical data.

Theme	Factor	Factor levels
Construct relevant		
Demonstrated competencies	Addressed competencies targeted in the scenario	Failed to address competencies targeted in the scenario/ Addressed some of the targeted competencies/Addressed all the targeted competencies
	Addressed additional competencies	Yes/No
Scenario engagement	Considered context of the scenario	Limited/Adequate/Excellent
	Insisted on lack of information	Yes/No
Justification and rationale	Vague rationale	Yes/No
	Depth of justification	No justification/Superficial/Limited/Clear & compelling
Perspective consideration	Considered perspectives	Considered one perspective/Briefly considered multiple perspectives/ Thoughtfully considered multiple perspectives
	Explicitly dismissed one side	Yes/No
Response quality	Provided insightful and/or unique arguments	Yes/No
Construct irrelevant		
Linguistic considerations	Noticeable grammatical errors (e.g., odd sentence structure)	Yes/No
	Used phrases suggested by 3rd party training materials (e.g., 'non-judgmental manner')	Yes/No
Video-response specific factors	Informal applicant appearance, clothing, and/or background	Yes/No
	Noticeable presence of longer pauses, silences, or disfluencies ("umm," "err," etc.)	Yes/No

2.3.1 Test selection

Casper tests were considered if they were from the most recent application cycle available (2022–2023) and written by a minimum of 1,000 test takers to a variety of health sciences programs (e.g., occupational therapy, physician assistant, nursing, etc.). Ultimately, we selected a test from June 2022 which featured responses from 1,264 unique US test takers.

2.3.2 Scenario selection

The selected test included responses to 9 typed responses and 6 video responses. A sample of 3 scenarios of each response type were selected. We aimed for scenarios which had a good balance in terms of three psychometric criteria: average scores, item total correlations, and magnitude of demographic group differences.

The average score for the 15 scenarios ranged from 4.66 to 5.60; we selected scenarios that had an average score closer to the overall average score, namely 5.09. Aiming to ensure that a test taker's score for a particular scenario was representative of their overall score, we only considered scenarios with an item total correlation between 0.30 and 0.70 as this range is often considered acceptable (50). All scenarios under consideration met this threshold, as their item total correlation ranged from 0.31 to 0.67. The magnitude of demographic group differences was assessed via Cohen's *d* values. We aimed for the demographic differences for the score obtained on these particular scenarios to be considered negligible, small, or moderate in magnitude. For this reason, we ensured that no scenarios produced Cohen's *d* values above 0.60 (51).

Following the identification of scenarios that met the desired quantitative thresholds, the final selections were discussed among the team to develop consensus. In total, six unique scenarios were selected for analysis: three typed responses and three video responses.

2.3.3 Response selection

Using the checklist (see Table 1), three researchers (MZI, RI, CR) conducted the content analysis independently, resulting in 243 observations (81 responses x 3 researchers) for typed responses and 237 observations (79 responses x 3 researchers) for video responses (2 responses removed due to technological issues). To ensure that the responses used in the content analysis were representative of the responses typically observed within a Casper test, we considered both the response score and the response length. Within each response score category, responses were labeled as short, average, or long according to word count for typed responses or video length for video responses. That is, the first tertile by response length within each of the 9 score categories was labeled 'short' (mean word count 168.2), the second tertile 'average' (mean word count 202.2) and the third tertile 'long' (mean word count 241.3). After this classification, for each possible score (1–9), a short, average, and long response was randomly selected. This process was completed for each of the six unique scenarios. After selection, two participants' video-response answers were removed due to technological issues. Thus, a total of 160 responses were analyzed: 81 responses for typed responses and 79 responses for video responses. Prior to conducting the content analysis on the selected responses, all three researchers completed a practice content analysis on nine typed responses and nine video responses. Upon completion of the practice content analysis, the researchers met to align on and further establish consensus on factor definitions and levels.

2.3.4 Study participants

This demographic information was collected through an optional self-reported survey that test takers complete immediately after their test. Consent to use test takers' responses for this study was obtained through the test's *Terms and Conditions* which are signed upon test registration. This signed consent allows for response data to be used in research projects in an anonymized and aggregate fashion. In Table 2, we report the demographic makeup of the 154 unique test takers in the study sample, as well as the demographic makeup of the study population, namely the 31,860 applicants to US health science programs who took Casper in 2022–2023.

2.4 Data pre-processing

Prior to conducting the content analysis, responses were grouped into three score buckets: low (scores 1–3), average (scores 4–6), and high (scores 7–9). We then converted factor levels into numerical values. The majority of factors (69.23%, $n = 9$) were binary and were numerically coded as 1 for *yes* and 0 for *no*. Four remaining factors had more than two levels and were numerically coded according to the level definition. For factors in which a characteristic could be completely absent, the coding started with 0 and continued to increase as the characteristic became more apparent (see Table 3 for further detail).

TABLE 2 Demographic makeup of participant sample.

	Study sample ($N = 154$)		Study population ($N = 31,860$)	
	n	%	*n*	%
Race				
Asian	26	21.31	3,515	14.73
Black, African, Caribbean, or African American	8	6.56	1,510	6.33
Hispanic, Latinx, or Spanish origin	14	11.48	2,949	12.36
Middle Eastern or Northern African	7	5.74	981	4.11
White or European	67	54.92	14,906	62.47
Another race, ethnicity, or origin/not answered	32	-	7,999	-
Gender				
Man	26	20.97	5,816	23.19
Woman	98	79.03	19,261	76.81
Other/prefer not to say/not answered	30	-	6,783	-
Age				
18–22	41	37.27	10,745	48.92
23–27	50	45.45	9,004	40.99
28 or older	19	17.27	2,216	10.09
Prefer not to say/not answered	44	-	9,895	-

Percentages in this table reflect only those who provided demographic information.

TABLE 3 Multilevel factor coding.

Factor	Factor levels	Numerical code
Addressed competencies targeted in the scenario	Failed to address competencies targeted in the scenario	0
	Addressed some of the targeted competencies	1
	Addressed all the targeted competencies	2
Considered context of the scenario	Limited	1
	Adequate	2
	Excellent	3
Depth of justification	No justification	0
	Superficial	1
	Reasonable	2
	Clear & compelling	3
Considered perspectives	Considered one perspective	1
	Briefly considered multiple perspectives	2
	Thoughtfully considered multiple perspectives	3

Given that the three researchers evaluated the same 81 responses, the researcher evaluations were averaged for each factor for each response to avoid treating evaluations of the same responses as independent items. For example, if two researchers labeled a response as having a limited depth of justification (coded as 2) and one researcher labeled the same response as having a superficial depth of justification (coded as 1), the average score for the depth of justification for this particular response would be 1.67. The value of 1.67 was then used in the quantitative analyses as the factor score for that particular response.

2.5 Statistical data analysis

First, the data were evaluated via descriptive statistics and Spearman correlation analyses. Spearman correlation coefficients were used to evaluate the relationship between each factor and response scores (1–9), as they allow users to measure the relationship between ranked variables (45). While correlation coefficients provide insight into the direction and strength of a relationship between the factors and scores, they are unable to explain the effect the two variables have on one another. Thus, for each content analysis factor, a single predictor logistic regression model was fit to predict (1) high scores (scores of 7–9) and (2) low scores (scores of 1–3), allowing us to estimate the likelihood of receiving a high and low score with each factor. All data analyses were conducted using RStudio Version 2023.3.0.386 (52).

2.6 Results

The descriptive statistics for each response characteristic across the typed-response scenarios and video-response scenarios are reported in Table 4. These include the mean, median, and standard deviation of the average researcher evaluation for each factor across all unique responses.

Below, we report the significant factors within each theme. Results from the correlation analyses are available in Table 5. Results from single-predictor bivariate logistic regression models that were fit are presented for each factor to assess the extent to which each could predict high scores and low scores are available in Tables 6, 7, respectively.

2.6.1 Demonstrated competencies

Responses that demonstrated the competencies of the test evidenced a positive and statistically significant relationship with scores. This is true for responses that addressed the competencies specifically targeted within the scenario (r_{Typed} = 0.59, $p < 0.001$; r_{Video} = 0.68, $p < 0.001$), as well as for responses that addressed those which were not specifically targeted within that particular scenario (r_{Typed} = 0.38, $p < 0.001$; r_{Video} = 0.43, $p < 0.001$). Further, demonstration of the competencies targeted in the scenario have greater odds of receiving a high score (OR_{Typed} = 5.88, $p = 0.001$; OR_{Video} = 58.67, $p < 0.001$). Responses which demonstrated other competencies that were not targeted in the scenarios also have greater odds of receiving a high score (OR_{Typed} = 6.57, $p = 0.004$; OR_{Video} = 8.77, $p = 0.001$).

2.6.2 Scenario engagement

Results indicate that scores tended to increase as the level of consideration and integration of the scenario context increased

TABLE 4 Descriptive statistics of response characteristics.

Themes	Factors	Typed responses					Video responses				
		Mean	Median	SD	Min	Max	Mean	Median	SD	Min	Max
Demonstrated competencies	Addressed competencies targeted in the scenario	1.36	1.67	0.76	0	2	1.46	1.67	0.61	0	2
	Addressed additional competencies	0.27	0	0.37	0	1	0.46	0.33	0.43	0	1
Scenario engagement	Considered context of the scenario	1.55	1.33	0.58	1	3	1.93	2	0.56	1	3
	Insisted on lack of information	0.13	0	0.31	0	1	0.06	0	0.21	0	1
Justification and rationale	Vague rationale	0.19	0	0.32	0	1	0.24	0	0.37	0	1
	Depth of justification	1.58	1.67	0.79	0	3	1.7	2	0.81	0	3
Perspective consideration	Considered perspectives	2.01	2	0.67	1	3	2.1	2	0.66	1	3
	Explicitly dismissed one side	0.11	0	0.29	0	1	0	0	0.04	0	0.33
Response quality	Provided insightful and/or unique arguments	0.17	0	0.31	0	1	0.22	0	0.34	0	1
Linguistic considerations	Noticeable grammatical errors (e.g., odd sentence structure)	0.13	0	0.28	0	1	0.01	0	0.05	0	0.33
	Used phrases suggested by 3rd party training materials	0.2	0	0.31	0	1	0.1	0	0.27	0	1
Video response specific factors	Informal applicant appearance, clothing, and/or background	NA	NA	NA	NA	NA	0.03	0	0.13	0	1
	Noticeable presence of longer pauses, silences, or disfluencies ("umm," "err," etc.)	NA	NA	NA	NA	NA	0.23	0	0.35	0	1

(r_{Typed} = 0.60, $p < 0.001$; r_{Video} = 0.61, $p < 0.001$); responses that considered and integrated the scenario context were also more likely to attain a higher score (OR_{Typed} = 2.22, $p < 0.001$; OR_{Video} = 9.20, $p = 0.001$).

2.6.3 Justification and rationale

Results indicate that providing a vague rationale had a negative impact on scores ($r_{Typed} = -0.41$, $p < 0.001$; $r_{Video} = -0.48$, $p < 0.001$) and increased the odds of receiving a low score (OR_{Typed} = 9.79, $p = 0.004$; OR_{Video} = 15.75, $p < 0.001$). Further, we found providing a higher-level justification had a positive impact on scores (r_{Typed} = 0.62, $p < 0.001$; r_{Video} = 0.71, $p < 0.001$) and increased the odds of receiving a high score (OR_{Typed} = 4.56, $p < 0.001$; OR_{Video} = 20.70, $p < 0.001$).

2.6.4 Perspective consideration

Scores are positively associated with the consideration of more perspectives (r_{Typed} = 0.51, $p < 0.001$; r_{Video} = 0.52, $p < 0.001$); responses that had a higher level of perspective consideration were more likely to achieve a high score (OR_{Typed} = 4.95, $p < 0.001$; OR_{Video} = 6.94, $p < 0.001$). Explicitly dismissing one or more of the perspectives in the scenario had a negative impact on scores for the typed responses ($r_{Typed} = -0.34$, $p < 0.001$) and increased the odds of receiving a low score (OR_{Typed} = 16.17, $p = 0.006$).

2.6.5 Response quality

Scores are positively associated with responses which were found to provide an insightful and/or unique argument or approach to the presented dilemma (r_{Typed} = 0.35, $p < 0.010$; r_{Video} = 0.47, $p < 0.001$) and these responses have greater odds of receiving a high score (OR_{Typed} = 6.33, $p = 0.017$; OR_{Video} = 30.97, $p < 0.001$). The presence of insightful and/or unique arguments or solutions evidenced lower odds of receiving a low score, although it was only significant for the video-response scenarios (OR_{Video} = 0.15, $p = 0.045$).

2.6.6 Linguistic considerations

Grammatical errors or the use of phrases suggested by 3rd party training materials were not significantly associated with scores. Also, the use of phrases suggested by 3rd party training materials was not predictive of low or high scores for video responses, however this factor achieved significance ($p < 0.05$) as a predictor of high scores for typed responses (OR_{Typed} = 4.42, $p = 0.049$).

2.6.7 Video-response specific factors

Informal applicant appearance and responses which contained noticeable pauses, silences, or disfluencies did not demonstrate a statistically significant relationship with scores. Only the presence of longer pauses, silences, or disfluencies (e.g., "umm," "err") was predictive of scores for video responses. Specifically, responses in which longer pauses, silences, or disfluencies were present had lower odds of receiving a high score (OR_{Video} = 0.12, $p = 0.028$).

2.7 Discussion

The goal of this study was to analyze the content of test takers' responses in order to identify which response characteristics evidenced a statistically significant relationship with scores. For the content analysis, we hypothesized that both construct relevant and construct irrelevant response characteristics would correlate with scores and that they would be significant predictors of low (1–3) and high (7–9) Casper scores.

The statistical analyses revealed that most of the construct-relevant factors identified in the checklist were indeed significant predictors of low and high Casper scores. The factors which related to the scoring guidelines (*Addressed competencies targeted in the scenario*, *Considered context of the scenario*) showed strong positive correlations with scores for both typed and video responses. These results provide evidence that assessors are mindful of the provided guidelines when

TABLE 5 Correlations between each factor and Casper scores.

Theme	Factor	Typed-response scenario		Video-response scenario	
		Correlation	*p*	Correlation	*p*
Demonstrated competencies	Addressed competencies targeted in the scenario	**0.59**	<0.001	**0.68**	<0.001
	Addressed additional competencies	**0.43**	<0.001	**0.38**	<0.001
Scenario engagement	Considered context of the scenario	**0.61**	<0.001	**0.60**	<0.001
	Insisted on lack of information	0.10	n.s.	−0.09	n.s.
Justification and rationale	Vague rationale	**−0.41**	<0.001	**−0.48**	<0.001
	Depth of justification	**0.62**	<0.001	**0.71**	<0.001
Perspective consideration	Considered perspectives	**0.51**	<0.001	**0.52**	<0.001
	Explicitly dismissed one side	**−0.34**	<0.001	−0.18	n.s.
Response quality	Provided insightful and/or unique arguments	**0.35**	<0.010	**0.47**	<0.001
Linguistic considerations	Noticeable grammatical errors (e.g., odd sentence structure)	−0.14	n.s.	−0.04	n.s.
	Used phrases suggested by 3rd party training materials	0.20	n.s.	−0.09	n.s.
Video response specific factors	Informal appearance, clothing, and/or background	NA	NA	0.03	n.s.
	Noticeable presence of longer pauses, silences, or disfluencies ("umm," "err," etc.)	NA	NA	−0.18	n.s.

Significant results ($p < 0.05$) bolded.

TABLE 6 Logistic regression models: predicting HIGH scores.

Theme	Factor	Typed-response scenarios				Video-response scenarios			
		Estimate	SE	*p*	OR	Estimate	SE	*p*	OR
Demonstrated competencies	Addressed competencies targeted in the scenario	1.77	0.55	0.001	5.88	4.07	1.12	<0.001	58.67
	Addressed additional competencies	1.88	0.65	0.004	6.57	2.17	0.63	0.001	8.77
Scenario engagement	Considered context of the scenario	2.49	0.57	<0.001	12.08	2.22	0.64	0.001	9.20
	Insisted on lack of information	0.13	0.77	0.863	1.14	−2.88	2.23	0.197	0.06
Justification & rationale	Vague rationale	−3.57	1.42	0.012	0.03	−2.98	1.11	0.007	0.05
	Depth of justification	1.52	0.40	<0.001	4.56	3.03	0.72	<0.001	20.70
Perspective consideration	Considered perspectives	1.60	0.44	<0.001	4.95	1.94	0.50	<0.001	6.94
	Explicitly dismissed one side	−3.74	2.33	0.109	0.02	−44.79[a]	4366.19[a]	0.992	NA
Response quality	Provided insightful and/or unique arguments	1.85	0.77	0.017	6.33	3.43	0.88	<0.001	30.97
Linguistic Considerations	Noticeable grammatical errors (e.g., odd sentence structure)	−0.92	0.99	0.350	0.40	−47.85[a]	5090.20[a]	0.993	NA
	Used phrases suggested by 3rd party training materials	1.49	0.76	0.049	4.42	0.21	0.87	0.814	1.23
Video response specific factors	Informal applicant appearance, clothing, and/or background	NA	NA	NA	NA	−2.20	2.86	0.441	0.11
	Noticeable presence of longer pauses, silences, or disfluencies	NA	NA	NA	NA	−2.08	0.95	0.028	0.12

[a]Variables were observed in less than 5% of the analyzed data, likely resulting in extreme values.

TABLE 7 Logistic regression models: predicting LOW scores.

Theme	Factor	Typed-response scenarios				Video-response scenarios			
		Estimate	SE	*p*	OR	Estimate	SE	*p*	OR
Demonstrated competencies	Addressed competencies targeted in the scenario	−1.28	0.35	<0.001	0.28	−2.50	0.57	<0.001	0.08
	Addressed additional competencies	−2.19	0.88	0.013	0.11	−1.30	0.61	0.034	0.27
Scenario engagement	Considered context of the scenario	−1.84	0.57	0.001	0.16	−2.53	0.63	<0.001	0.08
	Insisted on lack of information	−0.75	0.88	0.396	0.47	0.90	1.07	0.402	2.45
Justification & rationale	Vague rationale	2.28	0.80	0.004	9.79	2.76	0.73	<0.001	15.75
	Depth of justification	−1.73	0.45	<0.001	0.18	−1.91	0.47	<0.001	0.15
Perspective consideration	Considered perspectives	−1.32	0.42	0.002	0.27	−1.65	0.47	<0.001	0.19
	Explicitly dismissed one side	2.78	1.01	0.006	16.17	49.13	4366.19	0.991	NA
Response quality	Provided insightful and/or unique arguments	−1.38	0.94	0.143	0.25	−1.92	0.96	0.045	0.15
Linguistic considerations	Noticeable grammatical errors (e.g., odd sentence structure)	1.30	0.83	0.118	3.68	−47.50[a]	5090.20[a]	0.993	NA
	Used phrases suggested by 3rd party training materials	−1.65	0.97	0.087	0.19	0.37	0.87	0.672	1.45
Video response specific factors	Informal applicant appearance, clothing, and/or background	NA	NA	NA	NA	−47.85[a]	3705.94[a]	0.990	NA
	Noticeable presence of longer pauses, silences, or disfluencies	NA	NA	NA	NA	0.45	0.67	0.504	1.57

[a]Variables were observed in less than 5% of the analyzed data, likely resulting in extreme values.

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scoring: responses which can demonstrate the targeted competencies (collaboration, empathy, etc.) in the scenario and which relate their response to the context of the scenario are associated with higher scores. In addition, we found that test takers who thoughtfully justified their approach to the presented situation, carefully considered multiple perspectives, and provided insightful and/or novel arguments or approaches in response to the presented situation were more likely to receive a high score. Opposite to this, test takers who provided a vague or neutral rationale for their approach to the presented situation were more likely to receive a low score.

With respect to the four construct irrelevant factors we identified in the checklist, correlation analyses did not reveal significant relationships with scores overall. On the other hand, logistic regression analyses revealed that *Use of phrases suggested by 3rd party training materials* was a significant predictor of high scoring typed responses, while *Noticeable presence of longer pauses, silences, or disfluencies* was a significant predictor of high scoring video responses (OR = 0.12) indicating *lower* odds of receiving a high score. Lastly, responses with *Noticeable grammatical errors* or *Informal applicant appearance, clothing and/or background* within the video responses did not have a relationship with or impact on scores.[1]

Given that the lack of statistical significance for some of these factors might also be due to low sample size, future research should replicate this study with larger sample sizes. In the interim, we conducted a post-hoc replication of this content analysis with a second Casper dataset to observe any differences due to geographical setting. Thus, we followed the same procedure laid out above and examined a different set of 81 typed responses from an Australian Casper test. This post-hoc replication revealed similar results to the ones reported above: the same construct relevant factors exhibited strong positive relationships with scores, while construct irrelevant factors were not significantly associated with scores.

The results of this study contribute to the construct validity evidence for the Casper SJT and to open response SJTs more broadly from the perspective of the content of test takers' responses. While we found that factors related to the scoring guidelines used by assessors (demonstrating competencies, relating the response to the scenario context) were indeed significant predictors of scores, so were additional construct relevant factors, including the provided justification, the consideration of different perspectives, and the presence of what were considered to be 'insightful' or 'unique' arguments. We expected that these factors would also surface in Study II, where we examined the construct validity of Casper from the perspective of the scoring process.

3 Study II: think-aloud sessions

While in Study I we identified common characteristics of test takers' responses and whether these characteristics demonstrated statistically significant relationships with scores, in Study II we approach construct validity from the perspective of the assessors and how responses are evaluated by directly observing the scoring process. Based on the findings of our content analysis, we hypothesize that, in addition to the scoring guidelines, assessors might factor in additional construct relevant considerations (e.g., provided justification). Although construct irrelevant factors did not reveal strong relationships with scores in Study I, we hypothesize that response characteristics which emerged in the content analysis (language, appearance, etc.) might also be noted by assessors and could play a role in scoring.

3.1 Method

To observe assessors' scoring process and decision making, in line with similar research of this kind (31, 42), we used *think-aloud interviews*. *Think-aloud* is a method in which participants verbalize their thoughts, rationale and process while performing a given task (typically of higher-order thinking), or recall thoughts immediately following completion of that task (53). The theoretical underpinning of this method is that the thoughts elicited by the participants in real time are a valid reflection of the thoughts involved in the mediation of the task being performed (54). To capture assessor behaviors and to avoid cognitive overload, we split the think-aloud sessions into two phases: one think-aloud activity specifically targeted typed responses and another targeted video responses.

3.1.1 Scenario and response selection

For the think-aloud activities, we selected scenarios and responses from the data that were used in the content analysis. The three researchers who conducted the content analysis identified lower, average, and higher scoring responses that were hypothesized to elicit rich discussion from the think-aloud participants.

3.1.2 Participants

We recruited participants via a survey sent out to Casper assessors. Since the responses used in the think-aloud activities were from a North American Casper test, we recruited assessors from the US and Canada. The survey also included demographic questions (i.e., gender, race, age, geography, education level) to ensure that the selected participants were representative of the assessor population. 72 unique assessors expressed interest in participating in the think-aloud activity. When selecting participants, we used a stratified random sampling technique to ensure representation across demographic groups (i.e., race, gender, age) was approximately proportional with the total population of survey respondents. Ultimately, a total of 23 assessors participated in the two think-aloud sessions: 15 participated in the activity using typed responses, 4 in the activity using video responses, and 4 participated in both activities (see Table 8 for participant demographics). This resulted in 27 total think-aloud sessions.

3.2 Procedure

Recruited assessors participated in the think-aloud study conducted from May to August, 2023. The Independent Review Board at Veritas IRB reviewed and approved this study

1 It is important to note, however, that for video responses the factors *Noticeable grammatical errors* and *Informal applicant appearance, clothing, and/or background* were observed in less than 5% of the analyzed data. It is possible that these factors might achieve significance in a larger sample.

TABLE 8 Demographic makeup of think-aloud participants.

	Study sample (*N* = 23)		Survey respondents (*N* = 72)	
	n	%	*n*	%
Race				
Asian	4	17.4	9	12.5
Black, African, Caribbean, or African American	5	21.7	8	11.1
White or European	12	52.2	41	56.9
Another race, ethnicity, or origin	2	8.7	14	19.4
Gender				
Man	3	13	12	16.7
Woman	19	82.6	57	79.2
Other/prefer not to say	1	4.7	3	4.2
Age				
25–34	5	21.7	24	33.3
35–44	6	26.1	17	23.6
45–54	6	26.1	14	19.4
55–64	2	8.7	8	11.1
65–74	3	13	7	9.7
Other/not answered	1	4.3	2	2.8

(2023-3267-14464-1) on May 2, 2023. We obtained written informed consent for recording each session from all participants before the think-aloud activity, and participants also gave verbal consent during the activity. Each session lasted approximately 1 h, and all participants were compensated 50 USD or 60 CAD (depending on their country of residence) for their contribution to the study. In the first 10 min of each session, assessors were informed about the study objectives, the task expected of them, their role and the researcher's role during the activity, and their rights as study participants.

During the think-aloud activity, participants first reviewed the scenario and read the associated scoring instructions and guidelines. They were then asked to review and score each of the four responses one by one and concurrently verbalize their thought process. To avoid leading the participants and compromising the integrity of the results, the researchers did not ask any questions or interfere during the think-aloud portion of the session. Researchers were only responsible for recording the assigned scores (record maintained separately) and noting down any extraordinary observations or comments made by the assessors during the think-aloud.

After completion of the think-aloud activity, researchers conducted a short exit interview to probe for any information that was of interest, but not already offered by the assessor. The exit interview questions were designed to explore general scoring behaviors and potential assessor biases. The complete think-aloud activity guide, including follow up questions and exit interview guide (for both typed and video responses) is given in the Supplementary material.

3.3 Data analysis

Prior to data analysis, all interviews were transcribed verbatim using Whisper, an AI-based, automatic speech recognition platform (55). These transcripts were proofread and cleaned by all three researchers individually to ensure accuracy. We did this by playing the recording while simultaneously reading through the transcript and correcting anything that was missing or transcribed incorrectly.

After cleaning the transcripts, we analyzed the data using an inductive coding technique (56). Each researcher coded the next researcher's transcripts to ensure transparency and avoid researcher bias (57). These coded transcripts were then proofread by the other two researchers to ensure that we did not miss anything significant while coding the data.

After developing group consensus on coding, one researcher (MZI) grouped the codes into three categories (low, average and high scoring responses) based on the scores participants provided during the think-aloud activity and then developed themes and factors. Each theme represents the overarching domain and the factors represent the factors that underpin that domain. The other three researchers (RI, CR, JD) thoroughly reviewed the themes and factors and provided iterative feedback for improvement. The same data analysis approach was used for both think-aloud sessions (typed and video responses).

3.4 Results

Throughout the think-aloud sessions, seven themes were identified. The most prominent themes identified across all three score categories (low, average, high) in both typed and video response think-aloud sessions were: *demonstrated competencies, scenario engagement, justification and rationale, perspective consideration,* and *response quality*. *Linguistic considerations* was a common theme in both low and average scoring categories, whereas *concerning behaviors* was found in the low scoring category only. Table 9 provides all themes and factors alongside their associated frequencies. Below, each theme is described briefly.

TABLE 9 Themes and factors for all three scoring categories and associated frequencies (i.e., how often a factor was mentioned).

Themes and factors for LOW scores	Themes and factors for AVERAGE scores	Themes and factors for HIGH scores
• Demonstrated Competencies i. Failed to address targeted competencies [11] ii. Mentioned competencies (e.g., "empathy," "ethical") in responses but did not demonstrate them [4] • Scenario Engagement i. Misinterpreted and/or showed limited understanding of the scenario/questions [15] ii. Did not sufficiently engage with the scenario context/questions [3] • Justification and Rationale i. Provided vague and/or unclear justification without specific/concrete examples [18] ii. Provided generic explanation or solution [3] • Perspective Consideration i. Failed to consider multiple perspectives [11] ii. Imposed preconceived ideas or showed rigid thinking without acknowledging complexity of the situation [4] iii. Explicitly dismissed others' perspective(s) [2] • Response Quality i. Unnecessarily repeated the scenario question [6] ii. Lacked creative and/or insightful arguments [6] iii. Provided repetitive statements without additional content [4] iv. Provided limited/simplistic solutions [3] • Linguistic Considerations i. Used phrases typically suggested by third party preparatory materials (i.e., "I would approach X in a calm and non-judgmental manner)" without backing with substantial content [10] ii. Difficult to understand sentence/lacks coherence [3] iii. Seemed rehearsed and robotic [1] iv. Used condescending tone [1] • Concerning Behaviors i. Used inappropriate language (i.e., uses derogatory terms, demonstrates misogyny, inequity and/or racism) [7] ii. Showed lack of empathy [2]	• Demonstrated Competencies i. Briefly addressed some of the targeted competencies [15] • Scenario Engagement i. Demonstrated limited to reasonable understanding of the scenario context [7] ii. Engaged with the scenario in a limited fashion [3] iii. Misunderstood scenario context or question [2] • Justification and Rationale i. Provided vague and/or unclear responses/explanation without specific/concrete examples [17] ii. Provided limited or reasonable rationale/explanation, but not in depth [3] • Perspective Consideration i. Focused on one perspective without acknowledging different viewpoints [4] ii. Briefly considered multiple viewpoints or perspectives [4] • Response Quality i. Provided a mix of strong and weak answers [19] ii. Lacked creativity and/or originality [12] iii. Provided creative, novel, or original ideas, arguments, or solutions [10] iv. Unnecessarily repeated or paraphrased the scenario content [3] v. Sounded too rehearsed and robotic [2] • Linguistic Considerations i. Used phrases typically suggested by third party preparatory materials (i.e., "I would approach X in a calm and non-judgmental manner)" without backing with substantial content [8]	• Demonstrated Competencies i. Comprehensively demonstrated the targeted competencies [28] ii. Demonstrated competencies above and beyond those targeted in the scenario [23] • Scenario Engagement i. Showed clear understanding of and/or engagement with the scenario context [9] ii. Fully understood and addressed the questions [5] • Justification and Rationale i. Provided detailed, in-depth, reasoning/justification with nuance and complexity [23] • Perspective Consideration i. Recognized and carefully considered multiple perspectives [16] • Response Quality i. Provided insightful and/or practical solutions or arguments [19] ii. Provided creative, novel or original ideas, observations or solutions [19] iii. Provided multiple alternative solutions [11] iv. Provided specific and clear strategies, and solutions [10] v. Provided diverse answers to scenario questions (not repeating the same points/content again) [3]

3.4.1 Demonstrated competencies

Participants shared that the scores depended upon the extent to which test takers addressed competencies in their responses. For instance, high scoring responses comprehensively demonstrated the competencies targeted in the respective scenario and competencies beyond those that the scenario was probing for. Contrarily, the lower scoring responses failed to address some or all competencies. The two quotes below are two such instances of assessors explaining how demonstration of competencies impacted the score.

> *"[The responses] were in tune with what we were expecting of them in terms of, you know, collaboration [and empathy], and they also showed things like the other competencies that were not necessarily [targeted in the scenario] like self-awareness or problem solving. […] They were good responses in my opinion."* – (UR2; score 7).

> *"there wasn't a lot of problem solving [targeted aspect] in this situation for this first response. And so that's going to make me tend to score lower because I know that's one thing that we are looking for. Like, again, the scenario is intended to probe for problem solving and also resilience. So we are not really seeing a lot of that from this first response."* (AR3; score 3).

3.4.2 Scenario engagement

This theme represents the extent to which test takers incorporated the context of the scenario into their response and addressed the associated questions. Participants shared that high scoring responses showed clear understanding of the scenario; engaged well with the scenario context; and fully understood and addressed the questions. Contrarily, low scoring responses either misinterpreted or showed limited understanding of the scenario and/or the question(s); and did not engage sufficiently with the scenario context. One participant shared,

> *"[High-scoring responses demonstrate] identification of complexity or nuance, where people aren't giving very simplistic answers […] [and that] can be understanding the impact of context, right? […] something that shows that it's beyond, you know, a reaction, that there's some reflection"* (CR16; on high scores).

3.4.3 Justification and rationale

This theme represents the depth of the justification for the provided approach in the response. Participants shared that high scoring responses provided detailed and in-depth reasoning and justification, took a stance on moral issues, and gave explanations for their position. Contrarily, low scoring responses provided vague and/or unclear justifications without specific or concrete examples. One participant said,

> *"I feel like they could have gone into further detail. I would say a better response would have gone into more detail on how they can collaborate as a team […]. Just further explaining their response, you know. […]. Give examples."* (UR17; score 4).

3.4.4 Perspective consideration

This theme represents how test takers considered the perspectives of different parties within a scenario. Participants shared that high scoring responses typically recognized and considered multiple perspectives, whereas low scoring responses imposed preconceived ideas or showed rigid thinking without acknowledging the complexity of the situation; and explicitly dismissed others' perspective(s). One participant shared,

> *"[Low scoring responses are] too simple, um too polarized. […] Being dismissive of another perspective or another view or one of the people involved in the scenario. Um, just really uh, not giving any consideration to them or writing them off which I have seen, […] dismissing one of the players in this scenario too quickly."* (AR5; on low scores).

3.4.5 Response quality

This theme represents the quality of the provided argumentation or solution in the responses. Participants explained that high scoring responses provided creative, novel or original ideas, observations, or solutions to the presented dilemma; provided insightful and/or practical arguments or solutions; provided specific and clear strategies, or solutions; provided multiple alternative solutions instead of a single surface level solution; and provided diverse answers to the scenario questions instead of repeating the same points. Contrarily, low scoring responses provided limited (or simplistic) solutions; unnecessarily repeated the scenario information; provided repetitive statements without additional content; and lacked creative and/or insightful arguments. One participant said,

> *"Also, when the person comes up with a different solution than what everybody else is saying, then I score higher. I feel like sometimes the easiest solution is the same thing everybody says. It's the first thing that comes to mind. But when I hear somebody say something that's something different and it makes me think like, wow, they are not really thinking about the usual stuff." (UR14; on high scores).*

> *"See, these are the kind of answers that I look for! Because I think you cannot always handle problems in, like, the same way. […] sometimes it kind of requires being unique and thinking outside the box." (UR13; score 8).*

3.4.6 Linguistic considerations

This theme subsumes language related aspects including sentence structure, coherence, clarity and conciseness. In particular, participants shared that low scoring responses were difficult to understand; lacked coherence; used phrases typically suggested by third party preparatory materials (i.e., "I would approach X in a calm and non-judgmental manner") without supporting these statements with further content or rationale; used a condescending tone; and sounded rehearsed or robotic. The use of phrases from third party preparatory materials was also noted for average scoring responses. This theme did not emerge in the high scoring response category. One participant shared,

> *"And in [the response] can occasionally lie the "canned" formula answers without anything additional provided, right? I've been to the prep course, I've learned that I'm supposed to say, I'm going to "approach you in a non-confrontational manner," and then there's nothing else." (CR16; on low scores).*

3.4.7 Concerning behaviors

This theme refers to test takers' comments and/or behaviors that assessors found concerning, (e.g., unprofessional behavior, lack of empathy). Participants noted that low scoring responses can sometimes feature inappropriate language (i.e., used derogatory terms, demonstrated misogyny, inequity and/or racism) or insensitivity toward the individuals in the scenario. This theme only emerged in the case of low scoring responses.

3.5 Discussion

In Study II, we aimed to observe the scoring process while assessors evaluated typed and video responses in order to identify which factors pertaining to the responses might impact response scores. The results of this qualitative study with assessors largely corroborated the findings of our quantitative content analysis.

The most frequent theme that emerged during the *think-aloud* sessions and follow-up interviews was *Demonstrated Competencies*. As expected, based on the scoring guidelines, low scores were associated with perceived insufficient demonstration of these competencies, while responses that clearly demonstrated competencies were associated with high scores. Another construct relevant theme that was related to the scoring guidelines was *Scenario Engagement*. We observed that assessors tend to assign low scores to responses that show limited understanding of the presented dilemma, while high scoring responses engage with the scenario in more depth, and demonstrate complex and nuanced understanding of the dilemma.

Assessors also highlighted construct relevant response characteristics that were not included in the scoring guidelines directly; these characteristics correspond to the following themes: *Justification and Rationale, Perspective Consideration, Response Quality*, and *Concerning Behaviors*. Low scoring responses were frequently found to be vague, to be less considerate of the different perspectives in the scenario, to be repetitive, or to sometimes demonstrate lack of empathy or equity. On the other hand, high scoring responses were described as providing detailed justifications for their approaches, acknowledging and discussing different relevant perspectives to the presented dilemma, and as providing insightful, creative or multiple and diverse arguments and/or solutions.

Lastly, assessors flagged several construct irrelevant factors which we have listed under *Linguistic Considerations*. Some raters highlighted that low scoring responses may sometimes be unclear or lack coherence, or that they may sound "rehearsed" or seem "condescending." The most commonly mentioned factor in this theme, however, had to do with the use of phrases suggested by 3rd party training materials. The qualitative interviews revealed that assessors are largely indifferent to test takers' use of phrases such as "I would approach X in a calm and non-judgmental manner"; assessors were likely to find the use of these phrases generic and to assign responses including such phrases either low or average scores (see CR11 below).

> *"Well, there's a lot of [test takers who] are using, "I will talk to this person in a nonjudgmental, non-confrontational…" And I think those people have been coached to use that language. So, it's not really annoying, but it's not original and unique."* (CR11).

Overall, the results of this second study contribute to the construct validity evidence for the Casper SJT and to open response SJTs more broadly from the perspective of response characteristics noted by assessors during scoring. Our results show that assessors were indeed mindful of the information provided in the scoring guidelines and that the demonstration of competencies and understanding the complexities of the presented scenario were important considerations during scoring. Additional construct relevant factors mentioned by the assessors included the clarity and/or insightfulness of the provided arguments and solutions, and how the test takers consider and incorporate others' perspectives in their response. Lastly, we found that construct irrelevant factors like the use of specific phrases and the coherence of the response may also be considered during the scoring process.

4 General discussion

In the context of increased SJT use and research focused predominantly on SJT reliability, experts have highlighted a need for in-depth construct validity research (19, 40, 41). Typically, construct validity is estimated by examining the relationship between SJT scores and scores on assessments that measure similar constructs (3, 26). The counterargument to this approach is that the focus on what SJT scores relate to has led to a lack of clarity in terms of what SJTs actually measure (19, 40), and research to address this gap has been scant. To examine how SJTs measure their intended constructs, Wolcott et al. (42) explored test takers' cognitive process as they responded to fixed-response SJT items. In this paper, we focused on a different and novel piece of the construct validity puzzle, namely how the construct relevant and irrelevant characteristics of test takers' answers to open-response SJT items impact assessors and their scoring process. To address this gap, we used data from a commonly used open-response SJT in higher education admissions, Casper, which has strong psychometric properties (28, 46, 58).

Unlike fixed-response SJTs, where a test taker selects or ranks given responses, open-response SJTs allow test takers to freely respond to the question and provide reasoning and detail to their approach. This means that while open-response SJTs provide richer and more complex data, they also allow SJT assessors more room for interpretation when evaluating responses against the scoring criteria (30, 31), bearing similarity to the assessment of short essays (29). Given the complexity of these responses, we employed a mixed-methods approach. In Study I, we analyzed the content of archival Casper responses to identify potential factors and assess their statistical relationship with scores assigned by assessors. In Study II, we used *think-aloud interviews* to directly examine the scoring process, and how assessors interacted with the responses.

Results from both studies revealed construct relevant factors that relate to scores that may consciously or unconsciously impact scoring. First, both the quantitative content analysis on archival responses and the think-aloud activities with assessors reflected the instructions provided to assessors in the scenario-specific scoring guidelines. Namely, we found that test takers who demonstrated the competencies within the test construct (ethics, collaboration, etc.) and who demonstrated engagement and reflection on the context of the provided ethical dilemma were likely to obtain higher scores. Secondly, both studies revealed additional construct relevant factors, which are not directly related to the scoring guidelines. Results showed that assessors were mindful of the justification provided by test takers for their approach: responses with in-depth rationale were likely to receive higher scores, while vague responses were likely to receive lower scores. Analyzing the provided situation and providing a clear rationale is related to critical thinking (59, 60), which is an indirect component of two competencies targeted by Casper: problem solving and collaboration. Additionally, although not made explicit in the scoring guidelines, assessors also noted whether responses gave thoughtful or insufficient consideration to the various perspectives in the scenario, and whether they provided novel, insightful, creative, or generic and simplistic arguments and solutions. While perspective consideration is a facet of the Casper competency of empathy (61), the factor pertaining to creative or insightful or diverse arguments and solutions is again a reflection of problem solving and collaboration (60), as well as of critical thinking more broadly (62).[2]

While the correlations between scores and the four construct irrelevant factors identified during the content analysis did not achieve significance, logistic regressions in the content analysis revealed that video responses with noticeable pauses, silences, or disfluencies had

2 These construct relevant factors were found in the case of both typed and video responses. The only difference between the two formats was found for the *'Explicitly dismissed one side'* factor, which achieved significance in the content analysis of typed responses, but not in the content analysis of video responses. It is possible that either it is less likely for test takers to appear dismissive of other viewpoints in video responses, or that this characteristic was infrequent in the sample we analyzed.

lower odds of receiving a high score. Although such pauses were not mentioned by assessors during the think-aloud activities, a few assessors did note that responses that lack coherence or those which seem 'rehearsed' or 'robotic' are likely to receive low scores.

One assessor also noted that responses which have a 'condescending tone' may receive lower scores. While flow and cohesion may be construct-relevant in language assessments (29), they are not in the case of SJTs that measure social intelligence and professionalism. These findings bear similarity to those of Condor (34), who found that construct-irrelevant linguistic features (grammar, phrases) may impact the scores of open-ended responses on a mathematics assessment. In the case of our study, while the presence of grammatical errors did not have a significant effect on scores in either response format, linguistic aspects like tone, flow, and cohesion were salient.

Lastly, logistic regression analyses also showed that typed responses which included phrases suggested by third party training materials had higher odds of receiving a high score. On the other hand, the think-aloud activities and interviews with assessors revealed that the use of such phrases (e.g., "non-confrontational manner") was found 'unoriginal' and assessors believed that these phrases were used as an effect of reviewing unofficial test prep materials. These 'canned' phrases used without supporting evidence or rationale often resulted in low or average scores. The mixed results might suggest that while these phrases are found in both low and high scoring responses, and while Casper assessors are not likely to reward the use of these phrases because they seem 'canned' or 'empty', test takers who receive high scores tend to provide compelling responses *despite* the use of these phrases. Our previous work showed that applicants who used official Casper sources to prepare for the test scored highest, applicants who used 3rd party training materials performed worse, and those who did not prepare at all performed the worst (44). Given this context and our findings, it is possible that the use of phrases like "non-confrontational manner" may not have a positive effect on scores, but may be correlated with whether test takers prepared or not for the Casper test. Future research can provide more insight into how various third-party preparatory methods may impact scores.

4.1 Limitations and future research

This study is, to our knowledge, the first of its kind to investigate the construct validity of open response SJTs by examining (i) which response characteristics are associated with scores, and (ii) which implicit factors influence scores during evaluation. Given that validity research typically focuses on fixed response SJTs and on psychometric analyses and external metrics and assessments that relate to SJT scores (6, 19, 39) or on test item instructions (63), it is difficult to draw parallels between the nature of our novel results and previous findings. While Wolcott et al. (42) broke new ground by examining the cognitive processes of test takers in the context of fixed response SJT, we examined the scoring process of assessors evaluating an open response SJT. We hope that future research will delve even deeper into the construct validity of these assessments by undertaking mixed-methods and qualitative studies on the process of test takers and assessors alike.

While we found evidence to support that performance on an open response SJT like Casper can be impacted by both construct relevant and construct irrelevant factors, these results have only been based on Casper data, and have not been investigated in the case of other open response SJTs. We hope that this paper provides a methodology that researchers may apply to other open response SJTs in the future.

Although the think-aloud method is highly beneficial in collecting data on assessors' scoring process during their live evaluation of responses, this kind of study is subject to self-selection bias. It is possible that assessors who chose to participate in the study are more comfortable with the scoring guidelines, which is perhaps one reason why construct relevant factors related to the guidelines were featured so frequently. Additionally, it could be argued that this method, where an assessor is being observed while scoring, might preclude them from mentioning construct irrelevant factors. For instance, Casper assessors receive implicit bias training where they are instructed to not penalize grammatical errors, which might have prevented them from mentioning grammar during the think-aloud activities. Moreover, the participants of this study are regular assessors of the Casper test, and their role in test scoring could present a possible source of social desirability bias (where participants feel compelled to provide favorable answers rather than sharing their true opinion).

Another limitation of our research is the sample size. The content analysis was conducted on 160 responses and the think-aloud activity was conducted with 23 participants. It is possible that some factors are infrequent and might have achieved significance in a larger sample size. While the findings of the content analysis were corroborated in a post-hoc replication on a different set of 81 responses, we leave a larger scale replication of this study to future research.

4.2 Conclusion and implications

This mixed methods study contributes to the validity research of SJTs by investigating construct relevant and irrelevant factors that may impact assessors evaluating open response SJTs. Results from the quantitative content analyses of archival data and think-aloud activities with assessors reveal that several construct relevant factors have an effect on scores: both those which reflect the scoring guidelines, as well as additional implicit factors. We found that scores are dependent on the extent to which responses demonstrated the personal and professional competencies probed for by the SJT, engaged with the context of the presented ethical dilemma, provided in-depth justifications for their response, considered the various perspectives relevant to the scenario, and provided creative solutions or insightful arguments for their approach. We also found mixed results with respect to construct irrelevant factors, such as the flow, cohesion, and kinds of phrases used in the response.

This is the first study of its kind to analyze how response characteristics relate to construct relevant and irrelevant factors in open-response SJTs more broadly, but also for the specific test (Casper) that provided the data. With respect to Casper, we found that the two kinds of response formats (typed and video) were impacted by the same factors: the results were largely the same across the two formats. With respect to open-response SJTs, our study provides an approach for how to investigate construct validity by examining the content of the responses and the scoring processes of the assessors. Our results also provide evidence that open-response SJTs are valid approaches to measure professionalism related competencies such as empathy, collaboration, problem solving, and critical thinking more

broadly both in terms of *what* test takers focus on in their response, as well as in terms of *how* they construct their response.

Data availability statement

Research data are not publicly available due to the confidentiality agreements with Casper applicants. However, the raw, anonymized data and analyses performed in the study are available from the corresponding author upon reasonable request.

Ethics statement

The studies involving humans were approved by Independent Review Board at Veritas IRB (2023-3267-14464-1). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MI: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing, Resources. RI: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Writing – original draft, Writing – review & editing. CR: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Writing – original draft, Writing – review & editing. JD: Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

MI, RI, CR, and JD are employed by Acuity Insights, the company that provides the situational judgment test (Casper), which has been examined in this study.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmed.2024.1525156/full#supplementary-material

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EDITED BY
Kate Owen,
University of Warwick, United Kingdom

REVIEWED BY
Rabia S. Allari,
Al-Ahliyya Amman University, Jordan
Esra Çınar Tanrıverdi,
Atatürk University, Türkiye

*CORRESPONDENCE
Asil Sadeq
✉ asilsadeq@rcsi.ie

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Medical professionalism education: a systematic review of interventions, outcomes, and sustainability

Asil Sadeq[1]*, Shaista S. Guraya[2], Brian Fahey[1], Eric Clarke[1], Abdelsalam Bensaaud[3], Frank Doyle[3], Grainne P. Kearney[4], Fionnuala Gough[1], Mark Harbinson[4], Salman Yousuf Guraya[5] and Denis W. Harkin[1]

[1]Centre for Professionalism in Medicine and Health Sciences, Faculty of Medicine and Health Sciences, RCSI University of Medicine and Health Sciences, Dublin, Ireland, [2]Institute of Learning, Mohammad Bin Rashid University, Dubai, United Arab Emirates, [3]Department of Health Psychology, School of Population Health Sciences, RCSI University of Medicine and Health Sciences, Dublin, Ireland, [4]School of Medicine, Dentistry and Biomedical Sciences, Queens University Belfast, Belfast, United Kingdom, [5]Clinical Sciences Department, College of Medicine, University of Sharjah, Sharjah, United Arab Emirates

Introduction: Medical professionalism (MP) is a vital competency in undergraduate medical students as it enhances the quality and safety of patient care as it includes professional values, attitudes and professional behaviours (PB). However, medical institutes are uncertain about how optimally it can be learnt and assessed. This review aims to systematically provide a summary of evidence from systematic reviews reporting MP educational interventions, their outcomes and sustainability to foster PB.

Methods: Eight major databases (CINAHL, EMBASE, ERIC, Health business, Medline, OVID, PsycINFO, SCOPUS and Web of Science) and grey literature were systematically searched from database inception to June 2024. The inclusion criteria were (1) systematic review studies (2) of educational interventions of any type; (3) targeting any aspect of MP; (4) provided to undergraduate medical students; and (5) with no restrictions on comparator group or outcomes assessed. A qualitative narrative summary of included reviews was conducted as all included reviews did not conduct quantitative nor meta-analysis of results but rather a qualitative summary. Methodological quality of included reviews was assessed using A MeaSurement Tool to Assess systematic Reviews (AMSTAR) 2 tool.

Results: The search identified 397 references for eligibility screening. Ultimately, eight systematic reviews were deemed eligible for inclusion. The majority of these reviews have reported a successful improvement in various aspects of MP (i.e., MP as a whole, empathy and compassion) through teaching and exposure to hidden curriculum. The included studies displayed significant methodological heterogeneity, with varying study designs and assessment methodologies to professional outcomes. A gap remains in reporting the sustainable effect on professionalism traits and on a standardised approach to MP teaching.

Conclusion: This review suggests that more interventions are needed in this area with a focus on methodological quality and teaching methods in a multicultural context to support PB and professional identity formation.

Clinical trial registration: PROSPERO [CRD42024495689].

KEYWORDS

medical professionalism, medical professionalism education, professional behaviour, systematic review, sustainability, professional identity formation

1 Introduction

Medical professionalism (MP) is defined as encompassing a range of values, professional behaviours (PB), and attitudes that are expected from healthcare care professionals to maintain public trust and ensure patient safety (1). The evolution of MP towards a more patient-centred approach has significantly escalated over time, particularly in the late 20th century (2–5). Today, MP encompasses a range of attributes, including compassion, integrity, accountability, and a commitment to continuous learning (1). MP is critical for maintaining clinical competence and ensuring that healthcare decisions prioritize patient welfare above all other considerations (6). As modern healthcare becomes increasingly complex, driven by technological advances and ethical challenges, maintaining high standards of MP remains essential for promoting equitable, compassionate, and patient-centred care (3).

Within medical education, MP is a core component as highlights the importance of cultivating professionalism at three distinct levels: individual (i.e., empathy, decision making, and accountability); institutional (i.e., commitment to integrating professionalism into clinical placement); and societal level (i.e., patient care and public trust in the healthcare systems) (7). In recent years, medical schools strive to formalize and standardize this aspect of the curriculum provided to undergraduate medical students (UMS) (7). Traditionally, MP was learned implicitly through role modelling and clinical exposure at a postgraduate level (8). However, recent educational approaches advocate for explicit teaching, assessment, and reflection on professionalism to better prepare students for the complex professional dilemmas and challenges of clinical practice, these can include individual burnouts, cultural resistance/systematic pressure and societal signification of patient-centred care (9–12). This shift requires continuous improvement of curricula, including the integration of feedback mechanisms that allow students to reflect on and enhance their ethical conduct over time. Nevertheless, challenges persist, particularly due to the variability in how professionalism is defined across institutions and cultural contexts. This inconsistency creates obstacles to developing standardized curricula and objective assessment tools (10). Moreover, there is no clear consensus on which educational strategies are most effective for MP, especially in diverse, multicultural environments (13).

While these challenges remain, recent systematic reviews underscore the effectiveness of multifaceted interventions that blend theoretical knowledge (i.e., theory of constructivism, theory of planned behaviour, and social learning theory) with practical experiences (i.e., experiential learning) while also recognizing the critical influence of the learning environment on the development of PB and professional identity formation (14, 15). Despite these promising interventions, the literature remains limited regarding the long-term sustainability of these efforts aimed at fostering professionalism (16, 17). Many existing studies lack rigorous methodological designs and comprehensive evaluations of long-term outcomes (2). This lack of longitudinal data raises concerns about whether early gains in professionalism are sustained throughout the clinical years of medical training, where PB are particularly critical.

Educational interventions and efforts help ensure that MP teaching is not only relevant but also impactful (18, 19). However, to fully optimize these efforts, it is crucial to understand which approaches are most effective and sustainable. Thus, this review seeks to address the existing gaps by systematically evaluating the effectiveness of various professionalism education interventions. In particular, it will assess their impact on teaching methods, PB development, and the long-term sustainability of these interventions among medical students. By doing so, the review may provide clearer guidance on which methods lead to enduring improvements in MP.

2 Method

This systematic review, also known as an umbrella review (systematic review of systematic reviews) was conducted to systematically summarize the published systematic reviews in this area (20). The reporting was in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (21). The protocol of this systematic review was prepared using PRIMSA-Protocol statement and registered on PROSPERO [CRD42024495689]. The PICO framework guiding this review is as follows:

- Population: Undergraduate medical students (preclinical and clinical).
- Interventions: Educational interventions designed to foster at least one attribute of MP (e.g., reflective practice, peer feedback, portfolios).
- Comparisons: Studies with and without comparator.
- Outcomes: all reported outcomes were included.

2.1 Search strategy

Eight major data bases were systematically searched (CINAHL, EMBASE, ERIC, Health business, Medline OVID, PsycINFO, SCOPUS and Web of Science) and grey literature from inception of data base to June 2024 to identify relevant systematic reviews. The search terms included the keywords *"Medical professionalism" "humanism" "Professional behaviour" "undergraduate medical students" "educational interventions"* and their appropriate synonyms to the title/abstract/keywords fields. The search was restricted to English language and where applicable, the search was either filtered to *"systematic review"* methodology or this was added to the search string. The search strategy was developed with the information specialist from the library in the Royal College of Surgeons in Ireland.

2.2 Study selection

All retrieved references were exported to Endnote 20 ®; duplicates were removed, and then imported into COVIDENCE.org, where duplicates were automatically repeated. Two reviewers independently

screened references for title and abstract then for full text screening. Any conflicts between the two reviewers were resolved through discussion with a third reviewer. The same strategy was conducted for data extraction and quality assessment.

2.3 Data extraction and quality assessment

A data extraction form was developed with a team of expert researchers in systematic reviews and the topic of MP. The data extracted include characteristics of (i) systematic review (i.e., first author, publication year, aim, search date and number and type of study included); (ii) interventions included (type, duration, frequency, follow up, mode of delivery, themes of MP targeted); (iii) participants (number, undergraduate level/year, comparator characteristics); (iv) outcomes assessed; (v) key finding; and (vi) conclusion and suggestions.

The methodological quality of systematic reviews included was assessed using the A MeaSurement Tool to Assess systematic Reviews (AMSTAR) 2 tool (22) which includes a checklist of 16 criteria that critically appraises if the study had followed a comprehensive systematic protocol, bias and validity of conclusions. Two independent reviewers provide *"yes," "no,"* or *"partial Yes"* voting for each of the 16 criteria. The final AMSTAR 2 scoring was automatically categorised as critically low, low, moderate and high quality using the online ASMTAR calculator available online on https://amstar.ca/Amstar_Checklist.php.

2.4 Data analysis

A narrative summary of included systematic review was conducted s as all included reviews reported qualitative findings rather than a statistical analysis. Thus, meta-analysis of included reviews was not applicable.

3 Results

The search identified 397 references for title and abstract screening after the removal of duplicated ($n = 96$) (Figure 1). A total w48 full text studies were screened for eligibility, and 40 references did not meet the inclusion criteria. Ultimately, eight systematic reviews were eligible for inclusion (23–30).

3.1 Characteristics of relevant reviews

The eight included systematic review were published between 2011 and 2023 with an overall search duration from the inception of databases until 2022. These systematic reviews included a total of 367 studies. A total of 117,875 UMS at both preclinical and clinical level of education are included in the retrieved studies, except for one study which targeted only students during the preclinical stage only (25). The included studies displayed significant methodological heterogeneity, with varying study designs (e.g., qualitative, quantitative, and mixed-method approaches) and differing methodologies for assessing outcomes. A detailed description of included studies and participants is provided in Table 1.

3.2 Characteristics of interventions within relevant reviews

As described in Table 2, included studies involved education interventions that (i) were either provided either in-person (25, 26, 29) or using both in-person and an online platform (23, 24, 27, 28) (ii) were either embedded within the curriculum or provided as a separate session/workshop, as reported by seven SRs (23–29); (iii) ranged from single sessions to multiple sessions, as reported by five references (23, 25, 27–29); (iv) had a duration from 0.5 to 150 min, as reported by two references (28, 29); and (v) either compared with standard teaching, did not have a comparator group, or compared two teaching methods, as reported by five references (26–30). There was considerable heterogeneity in the interventions used across the studies, which ranged from reflective practices to peer feedback and audiovisual tools. This variability limits the direct comparability of results.

3.3 Methodological quality of included reviews

The included systematic reviews were evaluated for methodological quality using AMSTAR 2 tool. The methodological quality across studies varied, with the majority scoring between low ($n = 4$) (25, 27, 28, 30) and critically low ($n = 4$) (23, 24, 26, 29); mainly due to lacking rigorous methodological designs, particularly in terms of bias assessment and reporting transparency (Table 3).

3.4 Reported effectiveness of interventions on outcomes

Included reviews measured the effectiveness of educational interventions on two major topics: (i) MP as a whole ($n = 4$) (23, 24, 26, 29); (ii) specified empathy and compassion ($n = 4$) (25, 27, 28, 30); Leung et al. review have examined both topics and are discussed in both sections (27).

3.4.1 Medical professionalism as a whole

Four systematic reviews reported the effectiveness of educational interventions of MP as a whole (23, 24, 26, 29). These educational interventions were delivered through various models and techniques. For instance, reflective practice (23, 24, 27), role modelling (24), audio-visual media (29), and collective peer feedback (23, 26). Due to the narrative nature of these reviews and the diversity of interventions, direct comparisons of effectiveness across studies were not feasible. However, certain trends emerged, with reflective practice and peer feedback standing out as particularly effective in fostering PB. Guraya et al.' review systematically reported on the teaching strategies and their effectiveness in fostering MP and ability to analyse scenarios (i.e., identifying and analysing unprofessional behaviour) in UMS (24). The reviewers also identified multiple delivery modes of MP's pillars, these include group-based discussion lectures, simulations, virtual reviews, preclinical teaching and experiential learning during clinical placement (24). Nevertheless, they concluded that the discussed heterogeneity suggests the absence of an evidence base to a consolidated approach in MP teaching (24).

Leung et al. review explored and discussed a structured reflective practice as a promising aspect to develop MP education and bridge

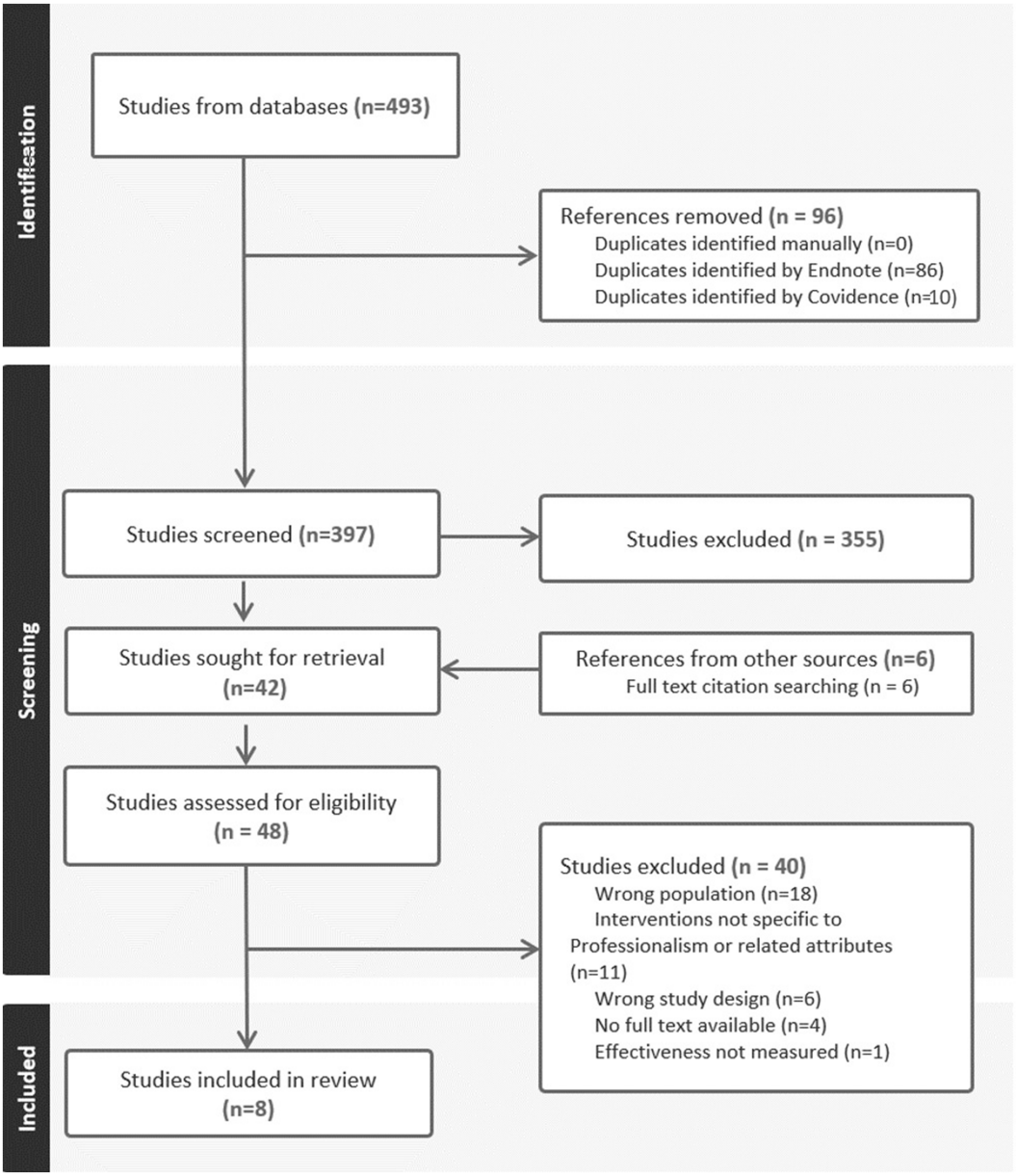

FIGURE 1
Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flowchart (21).

the gap between theory and practice when delivered successfully (27). They concluded that future intervention should be further tested to validate successful provision of reflective practice (27).

Lerchenfedlt et al. assessed the effectiveness of 'peer feedback' during collective MP learning and denoted the likely value in improving MP and PB in UMS (26). The authors suggested (i) a standardized agreement on the definition of collective peer feedback and its assessment methods and (ii) added that future research could further explore this area, specifying assessments on the quality of these interventions on faculty and patients' outcomes (26).

Rattani et al. (29) concluded that the use of trigger films in any MP teaching environment can improve engagement and fruitful discussions between UMS, especially in the current digital era. Trigger films, as explained by authors, characterised verbal conversations, non-verbal communication, reflective practice and inclusion of variety of different topics (29). The reviewers have suggested that trigger films should be relevant to scenarios experienced by medical students in clinical training (29).

Franco et al. (23) reported the use of portfolio as an effective tool in in reflective practice. Portfolios are reported to include an electronic 'peer feedback' discussion, defined in the review as either an assessment tool or a teaching approach, in which either have shown improvement in altruism as an attribute of MP (23). The authors discussed some degree of complexity that can contribute to failure of this approach, these include the timely process, lack of interest in some students and the use of scenarios irrelevant to practice (23). While these challenges exist, they suggested a framework to a support successful utility of portfolios that can adapted by researchers and educators (23).

TABLE 1 Characteristics of relevant reviews.

Author, year	Aim	Medical professionalism	Year	Studies (*N*)	Participants (*N*) + Education level
Franco et al., 2016 (23)	"To review the characteristics of portfolios and their outcomes for teaching professionalism to undergraduate medical students"	Medical professionalism as a whole	Inception—2015	11 studies Qualitative (n = 8) Quantitative (n = 2) Mixed methods (n = 1)	1,326; preclinical and clinical students
Guraya et al., 2016 (24)	"To identify effective teaching strategies for medical professionalism"	Medical professionalism as a whole	2005–2015	48 studies Qualitative and quantitative report, and empirical studies	Not speified; preclinical and clinical students
Ghosh et al., 2018 (25)	"To highlight practices adopted by medical schools that enhance the implementation of the "hidden curriculum" in human dissection, fostering professionalism among students"	Empathy and compassion	Not specified. Included studies were published from 1994–2017	Not specified	Not specified; preclinical students
Lerchenfeldt et al., 2019 (26)	"To examine the utilization, effectiveness, and quality of peer feedback during collaborative learning in medical education."	Medical professionalism as a whole	1997–2017	31 studies Quantitative (n = 15) Qualitative (n = 3) Mixed methods (n = 13)	±4,849; preclinical and clinical students
Rattani et al., 2021 (29)	"To evaluate and assess the functional use and application of short form audiovisual didactic supplements or "icebreakers" in medical ethics and professionalism teaching"	Medical professionalism as a whole	Inception—2019	13 studies Commentaires (n = 10) Qualitative (n = 2) Quantitative (n = 1)	Not specified; preclinical and clinical students
Menezes et al., 2021 (28)	"The review is associations between spectrum effectiveness, frequency of teaching and outcomes on empathy and compassion"	Empathy and Compassion	2015–2020	24 Studies Randomised Controlled Trials (n = 12) Controlled trials (n = 4) Single group pre/post test (n = 6) Single group post test (n = 2)	2,657; preclinical and clinical students
Wang et al., 2022 (30)	"To systematically review and synthesize studies investigating the predictors of compassion and related constructs (such as empathy) among medical students"	Empathy and compassion	Inception-2020	222 Empirical studies Quantitative (83%) Qualitative (12%) Mixed methods (4.2%)	108, 112; preclinical and clinical students
Leung et al., 2023 (27)	"To review the literature regarding the role of reflective practice in fostering empathy, wellbeing and professionalism in medical students"	Medical professionalism as a whole + Empathy and compassion	2010–2022	18 studies Qualitative studies (n = 9) Quantitative studies (n = 4) Mixed methods (n = 5)	931; preclinical and clinical students

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TABLE 2 Characteristics of interventions included in relevant reviews.

Author, year	Intervention type + MOD	Duration and frequency of interventions	Follow up	Comparator
Franco et al., 2016 (23)	Use of portfolios for teaching and assessing professionalism; included learning diaries and evidence of assessment. MOD: Electronic portfolios (web-based, email, software) + Paper-based portfolios	Ranging from weekly, monthly, regular or less frequent submissions. Most portfolios were used for one academic year or more.	Reflection and feedback were emphasized as critical components for the successful long-term development of MP.	Not specified
Guraya et al., 2016 (24)	Reflective practices-based studies; interactive lectures, vignettes, small group teaching, simulations, video reviews, experiential learning, dependent and independent learning, curriculum integration, early clinical exposure and faculty development programmes. MOD: Virtual or in-person.	Not specified	Not specified	Not specified
Ghosh et al., 2018 (25)	Showing video clips of donor interviews, interacting with family members of donors, and organizing memorial services. MOD: Virtual and/or in-person	Ranging from one-time event to ongoing throughout the anatomy dissection course and regular interactions through emails and letters.	Not specified, but suggests that the impact of these interventions can be long-lasting, shape students' attitude, and behaviour throughout the medical careers and may help students maintain an empathetic perspective throughout their professional training.	Not specified
Lerchenfeldt et al., 2019 (26)	Problem-based learning and team-based learning. MOD: In-person	Not specified—embedded within curriculum	The long-term impact was discussed in some studies, especially in terms of professional development.	Included studies often did not describe comparator characteristics clearly.
Rattani et al., 2021 (29)	The use of short form audiovisual media in the form of trigger films or short films/videos + the use of clips from TV and films MOD: not specified	Not specified; audio-visual content duration ranged from 0.5 to 150 min	Not specified	Comparisons were drawn between different types of audio-visual media (trigger films, short films, TV clips).
Menezes et al., 2021 (28)	Multiple teaching modalities including virtual hangouts, online surveys, computerised tasks, didactic, small group discussion, simulations, service-learning experience and early clinical exposure MOD: Virtual and in-person	Integrated within curriculum; Ranging from single session (1–2 h) to multiple sessions throughout academic year(s)	Some studies followed up after a period of time and showed some improvement in empathy and compassion	Standard curricular activity (teaching of empathy and compassion)
Wang et al., 2022 (30)	No specific interventions. The study focused on predictors of compassion and empathy, including personal factors, environmental factors, patient/family factors, and clinical factors; it employed self-report questionnaires, interviews, focus groups, and various measurement scales such as the JSPE and IRI	N/A	The review emphasized the need for more research into long-term impacts, particularly regarding environmental and clinical factors.	Studies included a wide range of factors as predictors, including sociodemographic factors, training-related factors, dispositional characteristics, and quality of life indicators.
Leung et al., 2023 (27)	Reflective practice methods (Balint groups, reflective writing and some direct teaching) MOD: Virtual and in-person group sessions	Ranging from single sessions to weekly/biweekly sessions.	Not specified	Some did not receive and intervention and others received other interventions.

MOD, Mode of Delivery; MP, medical professionalism; JSPE, Jefferson Scale of Physician Empathy; IRI, Interpersonal Reactivity Index.

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TABLE 3 Methodological quality assessment of reviews using A MeaSurement Tool to Assess systematic Reviews (AMSTAR) 2 scoring (22).

	AMSTAR items																
Author	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Score
Franco et al., 2016 (23)	Y	PY	Y	PY	Y	Y	N	PY	Y	N	0	0	N	N	0	Y	Critically Low
Guraya et a., 2016 (24)	N	N	N	PY	Y	Y	N	Y	PY	Y	0	0	N	Y	0	Y	Critically Low
Ghosh et al., 2018 (25)	N	N	Y	PY	Y	Y	N	PY	N	Y	0	0	N	N	0	Y	Low
Lerchenfeldt et al., 2019 (26)	N	N	Y	PY	Y	Y	N	PY	PY	Y	0	0	Y	Y	0	Y	Critically Low
Rattani et al., 2021 (29)	N	N	N	PY	N	Y	N	PY	0	Y	0	0	Y	N	0	Y	Critically Low
Menezes et al., 2021 (28)	Y	PY	Y	PY	Y	Y	N	Y	Y	Y	0	0	Y	Y	0	Y	Low
Wang et al., 2022 (30)	Y	PY	Y	Y	Y	Y	N	N	Y	Y	0	0	Y	N	0	Y	Low
Leung et al., 2023 (27)	Y	Y	Y	PY	Y	Y	N	PY	Y	Y	0	0	Y	Y	0	Y	Low

Y = Yes, N=No, PY = Partial Yes.

3.4.2 Empathy and compassion

As detailed in Table 4, four studies have systematically reported on the effectiveness of educational interventions on empathy and compassion (25, 27, 28, 30). The interventions varied widely, including reflective practice, virtual discussions, and group-based sessions, with mixed results depending on the context and delivery of the interventions. In three reviews, teaching techniques such as reflective practice, virtual discussions of donors, and in-person simulation, and group-based discussions have shown improvements in developing empathy and compassion in UMS (25, 27, 30). The majority of included interventions varied in outcomes and their assessment methods as detailed in Table 4. Authors have emphasized the importance of longitudinal exposure to the hidden curriculum by UMS at all levels of their education, from early exposure during their clinical placement stage (25, 27, 30).

Menezes et al.'s (28) review identified various teaching programmes designed and resulted in improvement in empathy and compassion in UMS. While a comparison in the effectiveness between the different teaching programmes was not achievable, the review has highlighted the need for a longitudinal curriculum agenda that can potentially include a blended programme, focusing on interprofessional practice and professional identity formation (28).

Leung et al.'s (27) review—the most recent included review—on the other hand, identified collective reflective practice in UMS as a promising approach to enhance and retain empathy and compassion, when exercised voluntarily. Similar to the majority of included reviews in our study, the authors included interventions provided to students at both pre and during clinical placement stage. Nonetheless, Leung et al. (27) highlighted the importance of the consistent learning during clinical placements and suggested that future research should examine the quality of MP teaching evaluation methods to maintain PB. The reviewer also assessed the effectiveness of wellbeing and reported that the lack of literature to provide evidence suggests that future research can explore the influence of collective reflective practice on the wellbeing of UMS (27).

Wang et al. (24) reported on the predictors of empathy and compassion, focusing on personal factors (e.g., cultural background, education level) and environmental factors (e.g., the educational culture and role modelling). While personal factors had inconsistent effects, environmental factors, particularly positive role modelling, were found to have a critical impact on developing empathy and compassion in medical students (30).

Ghosh et al. (25) focused on examining formation of MP and empathy in UMS using recorded video interviews of donors and meeting the donors' family members in dissection anatomy courses. The review reported a noted improvement in empathy and compassion as a result of the hidden curriculum exposure using patient factors and authors discussed the importance of this approach on MP education and development of professionalism in practice (25).

3.5 Sustainability of medical professionalism education

Six included reviews have reported details on the potential sustainability of MP education from included interventions and was dependent of specific implementation strategies used in each study. Leung et al. and Ghosh et al. have reported that collective reflective practice and digital clips of donors in dissection anatomy can foster PB and MP traits (25, 27). The authors have discussed the importance of linear exposure to hidden curriculum not only during the preclinical stage but also during their clinical training to support experiential learning and prolong positive development (25, 27). Ghosh et al. concluded on the promising impact of interventions included in preserving empathy and compassion (25).

Menezes et al. have emphasized the importance of the sustainability of MP teaching and learning provided to UMS as it can potentially support professionalism in practice (28). Franco et al. discussed challenges to achieving effective results and suggested that evaluation of the impact of teaching tools can support their term effects (23). Wang et al. informed the limited literature on the long-term effect of factors that influence PB in medical students and suggested further investigation from future research in this area (30). Lerchenfeldt et al. review did not report on long-term effect of included MP educational interventions, but concluded that future studies should further develop interventions and study benefits to professionalism in practice (26).

Overall, there is limited data on the long-term sustainability of professionalism education, with few studies evaluating the lasting impact of these interventions. This highlights a gap regarding the durability of professionalism education outcomes.

TABLE 4 Effectiveness of MP educational interventions on outcomes.

Author, year	Franco et al. (23)	Guraya et al. (24)	Lerchenfeldt et al. (26)	Rattani et al. (29)
Medical professionalism as a whole				
Outcome	Perceived relevance and usefulness of portfolios. Impact on reflection and self-assessment Effectiveness in supporting the development of MP competencies	Not specified	Effectiveness of MP education, student learning and collaborative team dynamics.	Evaluate the perceived utility and application of using audiovisual media in MP
Assessment	Varied; questionnaires and/or thematic analysis	Not specified	Varied; quantitative questionnaires, narrative comment, focus groups, and interviews	Varied; Qualitative appraisal and thematic analysis
Key findings	Portfolios were well received by students and considered a valuable tool for teaching and learning to improve reflection and self-assessment. Portfolios were well-regarded for fostering PB with their versatility and focus on reflection being highlighted as significant strengths. However, challenges included were the artificiality of reflections, time-consuming processes, and student preferences for other teaching methods.	Lack of unified model for teaching MP Most common strands for teaching MP: role modelling, mentoring, hidden curriculum, reflective practice and effective communication.	Peer feedback in collaborative learning environments may be reliable for assessing MP and aids in PB development Mixed results regarding the impact of peer feedback on students' collaborative team dynamic	Audiovisual media, particularly trigger films were considered effective and engaging tools to different teaching contexts and used as conversation catalyst through providing realistic scenarios.
Conclusion	The uses of portfolios in teaching MP is a promising strategy, particularly when reflection is effectively guided and assessed. The study proposed a framework for developing portfolios that foster professional behaviour.	There is no universally agreed model for teaching MP. The professional conduct of faculty role modelling and teaching core principles of reflective practice can encourage good MP practice through positive MP teaching.	Peer feedback is feasible and may be a useful method in MP education. However, training for both faculty and students is essential for effective implementation of this method.	Authors conclude that trigger films represent an effective and unique pedagogical strategy in supplementing current MP at undergraduate medical level
Review limitations	Small number of included interventions and their heterogeneity contribute to potential weakness of results.	Not reported	Language and publication biases Reporting bias of included studies; descriptive in nature thus limited drawing conclusion.	Selection bias of search strategy. Included interventions portrayed the educators perspective only.
Suggestions and implication	The review suggested that portfolios could be a powerful tool for teaching MP, but their success depends on careful implementation. Future research should focus on developing a standardised assessment method for portfolios and exploring the long-term impact of portfolios use on professional development.	International collaboration between academics to developing reflective practice and role modelling, targeted at improving patients care and professional excellence. More research is needed to explore the association between culture, versatility and gender in recruiting physician role-models and mentors	Further research is needed to standardize definitions for team dynamics for outcomes. There should be more focus on the quality of peer feedback on academic performance, institutional benefits and patients' benefit.	Authors suggested that educators consider incorporating short films and audiovisual into their teaching to enhance student engagement and promote discussion. Trigger films could be a cost-effective, relevant, and adaptable method for enhancing MP education, particularly for digitally native medical students.

(Continued)

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TABLE 4 (Continued)

Author, year	Franco et al. (23)	Guraya et al. (24)	Lerchenfeldt et al. (26)	Rattani et al. (29)
Empathy and compassion				
Author, year	Ghosh et al. (25)	Menezes et al. (28)	Wang et al. (30)	Leung et al. (27)
Outcome	Development of professionalism, empathy, and humanistic attributes among medical students.	Self-reported change in (1) knowledge, skills and attitude (2) Behaviour (3) Patient reported outcomes	Predictor of empathy and compassion	Empathy Professionalism
Assessment	Formal competency evaluation assessing professionalism through demonstration, commitment, behaviour, and core attributes.	Self-reporting questionnaire, behavioural assessment (e.g., standardised patient encounters, observed interactions) and patient reported outcomes measures (e.g., satisfaction surveys) Using Kirkpatrick model/MERSQUI scores/Jefferson scale of empathy.	Varied; Self-reporting questionnaires or qualitative interviews and focus group discussions or a combination of both.	Varied; quantitative measurement scales of empathy and qualitative analysis of reflective writing and discussion.
Key findings	Practices like showing donor interviews and involving donor families to: Humanize the dissection experience among medical students, fostering respect and compassion for the donor. Assess cultivating professionalism	Variety of teaching modalities (single/multiple modalities) were effective in improving empathy and compassion. There is a lack of continuity in teaching curricula of these topics.	Predictors of greater compassion included maturity, work and life experiences, openness to experience, perspective-taking, and positive role modelling. Conversely, negative attitudes, burnout, stress, and heavy workloads predicted lower compassion. The environment, including role models and the educational culture, significantly influences compassion in medical students.	Benefits of group reflective practice (when practiced voluntary): May help bridge the gap between theory and practice, foster collaboration, mitigate isolation through grasping biopsychological model of illness in the context of their patients Potentially preserve or enhance empathy in clinical placements if timing accurate—must be in clinical placements to ensure experiential learning
Conclusion	Incorporating humanistic practices in dissection curricula can significantly enhance MP among medical students and thus it is important to begin incorporating MP in the delivery of hidden curriculum.	Standard teaching using a blend of modalities should be introduced to emphasise compassion and empathy medical students.	Compassion in medical student is influenced by a wide range of personal, environmental, and clinical factors, with existing research primarily focusing on student-related factors.	Shows that group reflective practice may bring theory to life in clinical dilemmas, despite absence of studies directly examining wellbeing Early clinical exposure is helpful to medical students' development of appropriate MP attitudes and can help foster socially responsive career choices.
Review limitation	Not reported	Language bias Limited reporting of a representative demographic content (gender, race, ethnicity) High risk of bias of included interventions and low confidence measure	Language and time bias. Heterogeneity in methods and outcomes measures of included interventions limited the study's aim to: Highlighting the best practices for MP teaching. Reporting standardised curriculum.	Bias risk and applicability of results due to the variable quality of included interventions Lack of meta-analysis Strict search strategy Language bias

(Continued)

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TABLE 4 (Continued)

Author, year	Franco et al. (23)	Guraya et al. (24)	Lerchenfeldt et al. (26)	Rattani et al. (29)
Suggestions and implications	Medical schools should adopt these practices in the overall anatomy education to yield more empathetic and compassionate physicians.	There is a need to develop a standardised curriculum and highlight best practices which is important for sustained programmes is essential to mitigate the risk of decline in empathy and compassion, rather than a single training activity. There is a need for more rigorous design and measurement studies in this area.	Future research should focus on exploring patient, environmental and clinical factors that influence compassion and to address biases in existing studies. There is also a need for interventions that target more identity formation factors like perspective-taking and mindfulness. Addressing educational environments that prioritize knowledge over compassionate care is critical. The review emphasized the need for more research into long-term impacts, particularly regarding environmental and clinical factors.	Evaluation of the impact of group reflective practice is needed to improve quality of curriculum and consistent methods of evaluation is also needed. Future research should directly examine the relationship between reflective practice and well being

MP, Medical professionalism; MERSQUI, Multidimensional Empathy Response Scale for Quality Improvement.

4 Discussion

This review included an overview of SRs of interventions published in the last three decades including over 100 thousand UMS. These SRs included various study types that narratively assessed interventions of a wide range of teaching modalities aimed at improving MP as a whole and empathy and compassion. While some SR reported a degree of success in teaching techniques, there remains limited evidence on a standardized approach to MP education in UMS. All included systematic reviews presented a low-quality score and limited results were identified to provide evidence on the long-term impact of MP educational interventions.

While MP education is vital to UMS, published interventions in this area to date are limited in evaluating and developing MP in research (31). The limitation can stem from challenges given the inconsistent definition of MP education's and its uniformly across different contexts (32). In other words, aspects of MP, their interpretation and application can vary widely among individuals and institutions (33). This review adds to the body of evidence on significant challenge that is the lack of standardized, objective tools for measuring professionalism (2). Passi et al. explain that the nature of MP education in different contexts are often prone to bias and subjectivity, complicating efforts to produce developing curriculum on professionalism (18). Moreover, Mueller et al. adds the complications in designing a universal framework due to personal and cultural factors (34). Similar interpretations can be drawn from our review to reflect on the importance of the cultural sensitivity influence on the formation of an effective curriculum to developing PB in UMS. These complexities hinder the creation of a clear, evidence-based framework for research on professionalism. Thus, this review suggests that establishing the taxonomy of MP definition and learning outcomes is essential to support the development of a standardised/innovative assessment of MP educational syllabus, accommodating its dynamic and context-dependent nature. This suggestion is similar to a systematic review conducted by Al Rumayyan et al. on the differences between MP frameworks across multiple geographic regions (35).

Included SRs includes UMS at the preclinical and clinical stages of their educations. While results did not allow our review to draw comparisons between the two stages, it is important to acknowledge the growing research reporting the fundamental impact on their PB. On one hand, evolving interventions are focused on students on their preclinical stage for the benefits of developing PB and preparation for unprofessional dilemmas through critical learning and reflections (15, 36, 37). On the other hand, other interventions aim at targeting students in their later stage with focus on experiential learning (38, 39). These interventions are based on a theoretical perspective of behaviour and learning (40, 41) given their significance in explaining what works and does not work in an intervention. Additionally, the use of theory benefits the feedback loop in learning and bridging gaps between theory and practice (38, 41). This review suggests that future research should focus on a longitudinal curriculum design for different stages of learning that is based on a theoretical perspective and is needed to tackle gaps in professionalism in practice.

To date, there is limited evidence on the sustainability of MP educational interventions. Carr et al. suggests the complexity in

designing interventions aimed at exploring long term impact on outcomes (42). This review could not report of barriers and facilitators to studying the long-term impact of educational interventions included within SRs. Thus, the review highlights the ambiguity in literature reporting in this area. Furthermore, a wealth of research had been conducted towards the importance of extended learning of professionalism at the postgraduate level to further sustain PB and patient safety (43–45). This has emerged from the reported evidence of the declining in professionalism traits as part of the professional identity formation in residents and healthcare professionals (46). Ultimately, fostering professionalism at the postgraduate level is crucial for ensuring that healthcare professionals are equipped not only with technical expertise but also the ethical and interpersonal skills needed for professional and humanistic patient care. More research, particularly longitudinal randomised controlled trials are needed to understand the evolution of professionalism education at the undergraduate level and if postgraduate education is essential for the sustainability of PB.

4.1 Limitations

The potential always exists in reviewing extensive literature that important studies may have been missed either during the screening of SR published in English language and/or using systematic reviews as the unit of analysis not the original interventions. Secondly, while the search strategy was developed with a team of experts and subject librarian in the Royal College of Surgeons in Ireland, some keywords used to describe either MP or educational interventions, given the discussed inconsistent definitions of MP, could have omitted. Lastly, it is important to acknowledge that all included reviews exhibit a low methodological quality which consequently have a minor impact on conclusions drawn from this umbrella review.

5 Conclusion

The majority of included reviews have reported a successful improvement in various aspects of MP (i.e., MP as a whole, empathy and compassion) through teaching and exposure to hidden curriculum in UMS. A gap is still present in reporting the sustainable effect on professionalism traits in UMS and on suggesting a standardised approach to professionalism teaching and improvement in professionalism in practice. This review suggests that (1) future research should be towards a systematic review of methodological quality to support rigour interpretation; and (2) more educational interventions are needed in this area, with the focus on teaching methods in multicultural context to support professional identity formation and precursors of PB.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

AS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Writing – original draft, Writing – review & editing. ShG: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. BF: Formal analysis, Methodology, Writing – original draft, Writing – review & editing. EC: Conceptualization, Project administration, Software, Validation, Writing – original draft, Writing – review & editing. AB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing. FD: Conceptualization, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing, Data curation. GK: Conceptualization, Investigation, Validation, Writing – original draft, Writing – review & editing. FG: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. MH: Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing, Conceptualization, Data curation, Funding acquisition, Investigation. SaG: Conceptualization, Data curation, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing. DH: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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EDITED BY
Kamran Sattar,
King Saud University, Saudi Arabia

REVIEWED BY
Ahmad Firdhaus Arham,
National University of Malaysia, Malaysia
Desi Sukenti,
Islamic University of Riau, Indonesia
Fathur Rohman,
Nahdlatul Ulama Islamic University
Jepara, Indonesia

*CORRESPONDENCE
Zain Mohammed
✉ zain.mohammed.1@warwick.ac.uk
Hafsah Ba
✉ hafsah.ba@warwick.ac.uk
Linta Nasim
✉ linta.nasim@warwick.ac.uk
Emily Roisin Reid
✉ e.reid.1@warwick.ac.uk

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Supporting Muslim undergraduate medical students through medical school: lessons from a novel, student-led case-based learning intervention

Zain Mohammed[1,2]*, Hafsah Ba[1]*, Linta Nasim[1]* and Emily Roisin Reid[1]*

[1]Faculty of Science, Engineering and Medicine, Warwick Medical School, University of Warwick, Coventry, West Midlands, United Kingdom, [2]University Hospitals Coventry and Warwickshire NHS Trust, Coventry, United Kingdom

Introduction: Muslim medical students in the UK face discrimination, microaggressions, and inadequate institutional support, affecting their well-being, academic experience and outcomes. Using Case-Based Learning (CBL) as a pedagogical framework, a novel student-led teaching intervention was created and delivered to small groups of faculty and students, with the aim of enhancing awareness, promoting inclusivity, and supporting educators of these issues.

Methods: This CBL intervention was designed and led by Muslim medical student facilitators with subject expertise and previous experience in implementing curricular interventions. Scenarios based on real-life student experiences explored authentic challenges Muslim students face during their medical studies. Data were gathered to assess the effectiveness of the teaching innovation against its aims in the following formats: (1) in-session participant feedback, (2) transcriptions of the in-session discussions which demonstrated participant learning gain, and (3) notes from the post-session facilitator team reflections. These data were thematically analyzed using Braun and Clarke's six-point framework, with individuals coding the data individually and collectively across three meetings to refine and agree upon the themes.

Results: Five key themes of insights emerged from the data: Staff and Student cultural literacy relating to Islam, Facilities and Environment, Curriculum, Policy and Processes, Islamophobia and discrimination. The in-session discussions evidenced that participants had increased their cultural literacy and awareness of Muslim students' needs and identified practical solutions, including inclusive scheduling, making appropriate prayer facilities available to enable equitable educational attainment, providing clear clinical attire guidelines, and providing robust reporting mechanisms. The facilitators reflected that the students-as-experts aspect of the intervention equalized the usual faculty-student power dynamics. This promoted a sense of partnership that enabled participants in the sessions to take ownership of their own learning.

Discussion: CBL presented a valuable format for student-faculty discussions to promote cultural competence and equity in medical education. Variability in assumed knowledge and cultural literacy posed challenges, reinforcing the need for broader implementation of Equity, Diversity and Inclusivity (EDI) training and enhanced institutional support networks to develop cultural literacy further.

Conclusion: This student-led CBL educational innovation brokered a dialogue between students and faculty around solutions to the challenges faced by Muslim medical students. Given its success, student-led staff training could be expanded to address challenges faced by other minority groups, ensuring a more equitable and culturally competent learning environment.

KEYWORDS

Muslim medical students, cultural safety in medical education, equity diversity and inclusion (EDI), case-based learning (CBL), student-led faculty development, faith-based medical education interventions, inclusive medical education, religion and medical training

1 Background and rationale

Muslims constitute 10% of the medical workforce but face disproportionate challenges in training and career progression (1, 2). The General Medical Council (GMC) reports that Muslim trainees have the lowest success in their Annual Review of Competence Progression assessments and lower postgraduate examination pass rates compared to peers (3). Furthermore, minoritized ethnic heritage staff comprise 42% of the medical workforce but hold only 11.2% of very senior leadership roles (4). These disparities stem from systemic barriers, including bias in promotion decisions (5, 6) and limited access to professional networks and mentorship (7). Other factors include inconsistent institutional support for religious practices such as prayer and dress codes; policy regarding hijab in theater or "bare below the elbows" (8); and feelings of "othering" due to implicit or explicit bias (5, 9, 10). Such systemic barriers limit career progression and can directly impact patient care and public health. A diverse and representative medical workforce is crucial for ensuring culturally competent and equitable healthcare, particularly in the UK's increasingly diverse patient population (6). These challenges have transcended national boundaries, as one United States study identified that Muslim nursing students faced similar challenges (11).

This study sought to evaluate the role of educational interventions aimed at medical undergraduate educators and faculty in tackling these barriers through "Case-based learning" (CBL). This approach employs an enquiry-based learning model, enabling participants to explore new concepts, such as Islamic practices, while building on existing knowledge, emphasizing the role of empathy and solution building. Studies have demonstrated that scenario-based approaches facilitate perspective-taking, problem-solving, and engagement with real-world complexities. CBL effectively addresses racial and cultural inequalities and has been utilized across disciplines beyond medical training (12–16).

Given that many of these systemic barriers emerge early within medical training, targeting undergraduate education through a structured education intervention offers a proactive opportunity to address these challenges. Current research on Muslim undergraduate experience focused on broad themes of diversity and differential experience of minorities (17, 18), the impact of counter-terror measures and surveillance (19), Islamophobia at university (20) and limited appropriate emotional and psychological support services (21). Although this is valuable and pertinent to recognizing the challenges encountered by Muslim medical students in the UK, existing research does not evaluate interventions to mitigate the structural, professional and cultural barriers Muslim medical students face. A single study describes the success of a "Muslim Student Guide to Medical School" companion for new undergraduates. This intervention was effective in empowering students directly, rather than addressing the broader structural and institutional barriers that contribute to these challenges (22).

Addressing these barriers requires more than individual adaptation; rather, it demands a shift in the way cultural understanding and inclusion are approached within medical education, highlighting the importance of moving beyond "cultural competence". Historically, "cultural competence" has been the dominant framework used in medical education to prepare healthcare professionals for interaction with patients from diverse backgrounds (23, 24). It requires healthcare providers to understand the cultural norms and values of a patient group. However, this approach has faced criticism for promoting a superficial, checklist-based approach that emphasizes cultural knowledge acquisition over meaningful reflection and systemic change (23–25). Recognizing that culture plays a significant role in patient care and the integration of colleagues within the healthcare workforce (26), "cultural safety" has emerged as a more comprehensive framework. Cultural safety recommends healthcare professionals and institutions engage in continuous self-reflection, address structural biases, and deliver care that is defined as safe by the patient's experience (25). In contrast to "cultural competence", "cultural safety" emphasizes the importance of awareness of personal limitations and power dynamics, avoidance of assumptions, and the need for healthcare providers to engage in continuous self-evaluation.

CBL aligns closely with the principles of "cultural safety" by encouraging reflective practice, often in groups and critical examination of bias. It provides a structured environment for exploring how personal and institutional biases influence healthcare delivery (27). By facilitating open discussion on issues of religious and cultural identity, CBL supports deeper understanding and meaningful dialogue. This approach allows participants to identify and address the structural barriers that contribute to disparities in healthcare delivery and career progression. Equity, Diversity, and Inclusion (EDI) training, conducted through simulation teaching, has enhanced participants' knowledge, insight, self-efficacy, and EDI-related competence (28). Warwick Medical School has effectively implemented a CBL approach for student-led

EDI training of medical faculty (29). Thus, using CBL was a natural choice to introduce concepts of cultural safety, humility, and sensitivity, addressing Muslim medical students' specific needs and challenges. The novelty of this activity lies in the student-led CBL format, whereby the expertise of student facilitators stems from lived experience, which may not be present among participants and helps to inform and guide the activity.

2 Aims for this educational innovation

This study sought to answer the question: "What key insights emerged from a student-led CBL intervention designed to enhance participants' understanding of the challenges faced by Muslim medical students and improve their ability to identify personal and institutional strategies for addressing these challenges?" Specific learning objectives for the session have been outlined in Figure 1.

This intervention aimed to develop participants' cultural awareness and humility, improve understanding of the Islamic faith and doctrines and enable reflection on how institutional and personal biases impact Muslim medical students' educational experiences and outcomes. Through a student-led CBL format, the intervention sought to foster practical, solution-focused dialogue and drive institutional change. In doing so, this study seeks to bridge the gap in evidence by highlighting how this student-led CBL training may be helpful for faculty and students as an intervention to promote cultural awareness and inclusivity within medical education.

3 Theoretical frameworks, principles, and standards

During CBL, learners are presented with real-world scenarios or clinical cases, identifying key issues, exploring underlying concepts and vocabulary, and proposing solutions through peer discussion and investigation. The process typically unfolds in three phases: learners first identify gaps in their knowledge, then explore the case collaboratively, discuss potential solutions and underlying biases, and finally present conclusions. Learners should reflect on the process and receive feedback to support continuous improvement (12). In this instance, a peer-led format creates a psychologically safe environment, encouraging open dialogue and exploration of complex social and cultural issues.

This process is underpinned by established pedagogical theories, incorporating a constructivist approach that emphasizes knowledge construction through experiences and social interactions. Constructivism requires that learners develop a deeper understanding to engage with real-world problems, reflect on existing knowledge, and develop their understanding through peer discussion and guided inquiry (30, 31). Research has shown that CBL enhances clinical reasoning, reflective practice, and learner engagement, with participants reporting increased motivation and deeper understanding. Educators similarly value CBL for its ability to foster independent thinking and active participation (20).

The use of CBL aligns with the professional competencies outlined by the General Medical Council (GMC) in Good Medical Practice (2024), through reflective practice, and effective communication. The GMC emphasizes the importance of treating patients and colleagues with respect, recognizing the impact of personal and systemic biases, and fostering an inclusive learning and clinical environment (32).

CBL provides a structured framework for developing these competencies, encouraging participants to reflect on their assumptions and engage with diverse perspectives. Through peer-led inquiry, participants are challenged to identify practical solutions for addressing institutional barriers and improving cultural safety within healthcare settings. Developing these competencies is essential for delivering equitable and culturally competent care within the NHS.

CBL's peer-led format makes it effective for exploring sensitive issues related to religious identity and discrimination. Drawing on the lived experiences of Muslim medical students, the authors designed a case study that facilitated discussions to achieve key learning outcomes. CBL's ability to engage learners with real-world complexities allowed participants to explore how systemic bias and institutional barriers affect Muslim medical students' educational and professional experiences and outcomes. By fostering reflective practice and encouraging solution-focused dialogue, the intervention aimed to improve understanding of cultural identity and equip participants with strategies to address both personal and institutional biases. This intervention demonstrated that CBL was an effective approach to exploring concepts of cultural safety, humility, and addressing the specific needs of Muslim medical students and challenges.

4 Methodology

4.1 Intervention design

This CBL intervention was designed and led by Muslim medical student facilitators with subject expertise and previous experience in implementing curricular interventions. The authors created scenarios based on real-life student experiences of the kinds of barriers explored in the cases. The students had previous experience in facilitating sessions, in addition to lived experience and subject expertise. They chose CBL as a common method that is familiar within medical education, to facilitate discussions and explore authentic challenges Muslim students face during their medical studies.

Sessions were delivered across three settings between December 2023 and July 2024:

- A senior faculty event at Warwick Medical School ($n = 45$; including those who viewed the recording);
- A clinical medical undergraduate CBL facilitator training session in February 2024 ($n = 24$);
- A workshop at the ASME Annual Conference in July 2024, attended by 44 medical educators and students.

The sessions applied core principles of CBL, incorporating co-designed scenarios based on lived experience. Each scenario was followed by clarification of unfamiliar terms, small-group discussion, and collective solution-building. Scenarios focused on

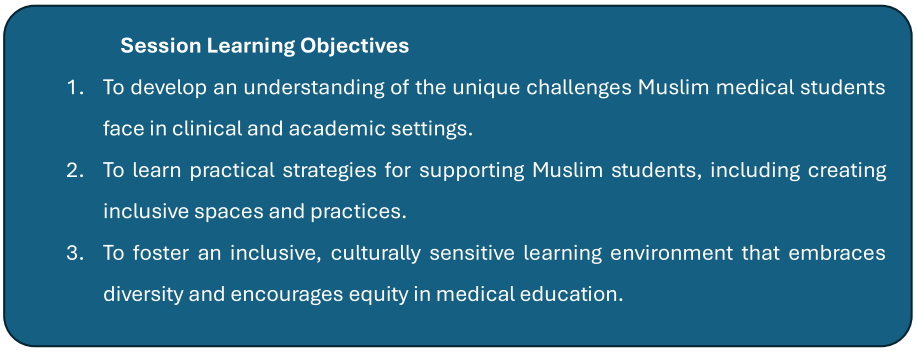

FIGURE 1
Session learning objectives.

four key domains: navigating social norms, religious practices in clinical education, modesty and the hijab, and experiences of Islamophobia. Narratives are presented in Figure 2.

Participants were recruited to attend the sessions using purposive sampling to capture a wide range of perspectives. Attendees included medical students, faculty, tutors, course directors, and clinical staff, from both Muslim and non-Muslim backgrounds, with a range of ethnicities and levels of seniority. Participation was voluntary, and no exclusion criteria were applied. The initial two sessions for medical school faculty and CBL facilitators invited participants via internal email, whilst the conference session was open to all attendees of the conference and advertised on the itinerary. All sessions created safe discussion spaces, guided by trained facilitators with lived experience. Participants were grouped into 6–10 individuals, discussed scenarios with facilitators guiding conversations and later reconvened to share insights with the larger group The varying settings influenced participant engagement: small group classroom-style sessions encouraged richer interaction.

The participants consented to sharing their data for the purposes of evaluation and wider dissemination. As this article constitutes a secondary analysis of existing anonymous information, ethical approval was not required.

4.2 Data collection and analysis

The evaluation wished to move beyond a simple participant satisfaction, and to achieve higher levels of Kirkpatrick's framework (33), capturing evidence of learning and intention to change behavior and practice. Therefore, to evaluate the effectiveness of the teaching innovation against its aims, we gathered and grouped the following data:

- Facilitator annotations of solicited participant feedback at the end of each session, cross-referenced with transcriptions of recorded content.
- Transcriptions and annotations from the in-session discussions, with a focus on participant learning gain (i.e. the difference in where they started in discussions to where they ended up in their understanding).
- Facilitator reflections, collated in debriefing meetings following each event.

Data were analyzed using thematic analysis (34). Coding was performed independently by multiple facilitators, who later met for three analytical group discussions to refine themes, resolve discrepancies, and agree on the final themes. The collaborative thematic cross-checking was employed to mitigate bias and ensure rigor across the sources of data.

5 Results

5.1 Session evaluation and thematic analysis

At the end of the sessions, the facilitators sought feedback into the session's effectiveness against it's stated aims. Participants consistently praised the respectful and inclusive environment created during the session, noting the sensitivity of facilitators. Comments about the "thoughtful, inclusive, and kind leading of this session" underscored the positive atmosphere, as well as highlighting the high value staff portrayed toward the student facilitators. The session was recognized for its educational impact, particularly in increasing awareness of Islamic practices and the challenges faced by Muslim students. Attendees also appreciated the practical elements of the session, including the use of the CBL approach and visual aids, which effectively engaged participants. Based on participant feedback from the first iteration, the session was refined to enhance engagement and learning. The number of slides was reduced, allowing for more interactive discussions and real-life case scenarios, while smaller group discussions encouraged deeper dialogue. To support continued learning, take-home resources were introduced, including handouts, glossaries of key Islamic terms, prayer schedules, and guidance on religious accommodations in medical settings. These improvements enhanced interactivity, inclusivity, and practical relevance, ensuring a more impactful learning experience.

Case-Based Learning Scenarios

Part 1: Building Bridges: Social Interactions in a Diverse World

Scenario:

Maryam joins her new medical school and excels academically and socially. However, she encounters a situation where she is invited to a fresher's party, which she feels uncomfortable attending due to her religious beliefs. Instead of attending, Maryam suggests an alternative—a coffee walk around the campus, which the group accepts. This scenario sets the stage for discussing social inclusivity in medical school.

Learning Objectives:

This segment explores the importance of inclusive social environments considering students' diverse cultural and religious backgrounds. It challenges educators and peers to rethink conventional social activities and to recognise the positive outcomes of accommodating suggestions that foster inclusivity. Key questions include:

- Why was this a positive outcome for the group?
- What if Maryam had been more hesitant about her suggestions?
- What would be the implications of her agreeing to attend the fresher's party?
- How can educators facilitate more inclusive environments?

Part 2: Balancing Duties: Integrating Spiritual Practices at School and Work

Scenario:

Maryam's commitment to her religious practices becomes evident when she needs to perform her afternoon prayer during a busy day of teaching at the off-site anatomy building. Maryam is faced with finding a suitable place for wudhu (ablution) and prayer, she feels uneasy performing these acts in public spaces, such as sinks and shower facilities, which are not designed with privacy in mind. She eventually finds a private cubicle where she can perform ablution and prayer discreetly.

Learning Objectives:

This section highlights Muslim students' logistical and emotional challenges when fulfilling their religious obligations in academic settings. It emphasises the need for supportive infrastructure and understanding from educational institutions. The discussion aims to explore:

- Why are Maryam's prayers vital to her?
- What prayers need to be performed, and are they time-sensitive?
- What challenges might she have with asking to be excused?
- How is wudhu performed, and what are the logistical challenges?

Part 3: The Hijab and Professional Identity: Integrating Hijab in Professional Settings

Scenario:

Maryam's story then focuses on her experiences in clinical and professional settings while observing the hijab. During a clinical skills session, Maryam feels anxious about the requirement for appropriate exposure while performing examinations, particularly when observing her hijab. She finds relief in the availability of privacy curtains, which allow her to maintain her modesty without compromising her learning experience. The scenario

FIGURE 2 (Continued)

Five overarching themes with subthemes emerged from the data (see Figure 3). These represent the key areas that the CBL intervention demonstrated the most impact relating to participants' learning, both in terms of challenges faced by Muslim medical students and enablers they identified they could implement to improve their student experience going forwards.

further explores Maryam's experiences in the operating theatre, where her hijab becomes a point of contention. An oversight in understanding the regulations of hijab in theatre by a staff member leads to an uncomfortable situation for Maryam, reinforcing the need for greater awareness and accommodation of religious dress codes in clinical settings.

Learning Objectives:

This section emphasises the complexities of maintaining professional standards while respecting religious dress practices. It aims to educate students and staff on integrating religious attire in healthcare environments and promote solutions that support inclusivity. Key questions include:

- Why would Maryam not feel comfortable volunteering for demonstrations?
- Can hijabs be worn in theatre, and what are the guidelines?
- How might the power dynamics between students and staff affect consent?

Part 4: Navigating Bias and Islamophobia in Clinical Settings

Scenario:

Maryam attends a clinical session with a senior consultant alongside another student. She arrives early, prepared and eager to engage. However, from the start, she noticed that the consultant seldom made eye contact with her, directing most questions and attention towards her non-Muslim colleague, who arrived late. During the session, Maryam makes a minor mistake by repeating a question during history taking, leading to the consultant publicly criticising her attentiveness. In contrast, her colleague's errors are met with a supportive tone. This encounter leaves Maryam feeling undermined and embarrassed, illustrating the subtle dynamics of bias and differential treatment that Muslim students may experience.

Learning Objectives:

This segment aims to illuminate the impact of implicit biases and Islamophobia on the educational experiences of Muslim students. It seeks to foster awareness and encourage educators to adopt fair, supportive, and inclusive teaching approaches that respect the diversity of their students. Key discussion points include:

- How would this scenario affect Maryam's confidence and engagement?
- What is the impact of perceived bias on student performance and mental well-being?
- Who could Maryam turn to for support in this situation?
- How can educators and institutions address bias and support affected students?

FIGURE 2 (Continued)
Case-based learning scenarios.

5.2 Staff-student awareness of cultural practices

Participants demonstrated limited awareness of prayer room requirements, Islamic prayer times, their seasonal variations, and the implications of missing prayers. Muslim prayers are performed at specific times dictated by the sun's position, such as Dhuhr (midday) and Asr (afternoon), each within defined periods. Participants also had limited awareness regarding the significance of Jummah, the Friday congregational prayer performed in a

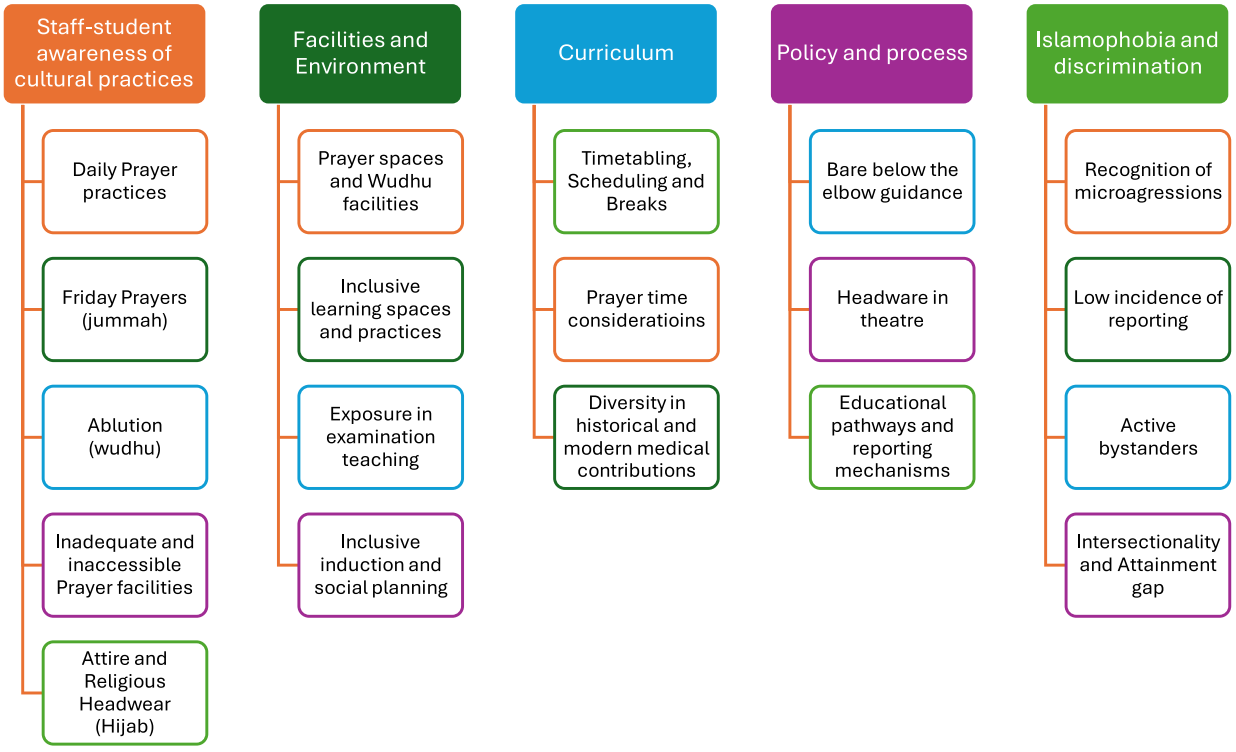

FIGURE 3
Themes and subthemes developed through Muslim medical student experience CBL.

larger assembly. Missing normal prayer times requires later compensation, which is less than ideal for Muslim students. This lack of understanding can lead to scheduling issues that mean students miss learning opportunities, resulting in cumulative deficits to their learning outcomes, as well as unintentional insensitivity toward Muslim students' needs. The variability of Muslim prayer times presents challenges in aligning with standard academic schedules. The discussions within the sessions explored that whilst tailoring timetables to specific prayer times may not be feasible, providing designated periods and appropriate facilities for prayer and wudhu is essential. Some institutions have adopted solutions such as "protected lunch breaks"; time that is safeguarded from any educational activities for students.

Similarly, the concept and practice of wudhu (ablution) were unfamiliar to many participants, including its frequency (up to five times daily) and requirements, such as washing the hands, face, arms, head, and feet, typically taking about 5 min. This knowledge gap results in insufficient facilities and inadequate support for Muslim students to meet their religious obligations. For example, the lack of private spaces for hijab removal, interruptions during wudhu often in shared spaces, and the impracticality of washing feet in sinks, which poses barriers to performing wudhu with dignity, can negatively impact students' learning experience. Accessible washing, prayer spaces, and regular rest intervals can accommodate students' religious practices without significantly modifying timetables and schedules. While some UK universities and schools provide wudhu-specific facilities, their availability is inconsistent, leaving many students reliant on public or private toilets, which are less ideal.

5.3 Facilities and environment

The scenario presented in this case was derived directly from students' real-life experiences in medical school, prompting participants to reflect on their perspectives. There was unanimous agreement that requiring students to perform examinations on one another in an open setting was unacceptable. Privacy measures, such as curtains, were identified as essential to ensure comfort and dignity, benefiting all students alike.

The discussion also raised concerns about students' expectations to examine each other. Participants noted that students might feel pressured to comply, even if uncomfortable, to support their peers' learning. As a solution, using simulated patients or actors in teaching sessions involving physical examinations was proposed as a more inclusive and suitable alternative for medical schools to adopt.

6 Curriculum

6.1 Scheduling, breaks, and prayer times

Long teaching sessions without breaks posed challenges for students needing to perform prayers, particularly during

winter when prayer times are closely spaced. Participants recommended incorporating brief 5–10-min breaks every 45–50 min to accommodate prayer needs. This adjustment would enable Muslim students to fulfil their obligations without disrupting the session's flow while also benefiting all students by providing rest periods. Such an approach promotes inclusivity and respects the diverse needs of the student body.

6.2 Policy and process

6.2.1 Inconsistent policies on bare below the elbows

Discussions highlighted significant inconsistencies in applying bare-below-the-elbows policies across various medical schools and NHS trusts. According to NHS guidance, long sleeves may be worn when staffs are not in direct contact with patients, and disposable sleeves can be used over clothing when necessary (35). However, participants reported variability in how these policies are enforced, often leading to confusion and conflicting instructions from colleagues. In some cases, students shared that they had been reprimanded for wearing long sleeves despite the guidance, further exacerbating their challenges. These inconsistencies underscore the need for clearer communication and uniform enforcement of policies to ensure fairness and understanding across clinical settings.

6.2.2 Awareness of guidelines for religious headwear in theater

Participants demonstrated limited awareness of the rules and regulations regarding religious headwear in theater. Many were unfamiliar with the 2020 uniforms and workwear guidance for NHS employers, which permits the use of normal cloth headscarves during theater attendance, provided they are subsequently washed at 60°c, with or without an additional theater cap (35). Facilitators played a key role in highlighting this guidance, underscoring the importance of raising awareness about diversity in workwear policies across NHS trusts.

6.2.3 Educational pathways and reporting mechanisms

There was differential knowledge from the participants of reporting processes and when to advise students on escalation. It is essential that Muslim students know where to seek support and feel confident reporting concerns without fear of reprisal or minimization.

6.3 Islamophobia and discrimination

6.3.1 Recognition of islamophobia and microaggressions

The case study highlighted instances based on real-life Muslim students' experiences in which wearing visible religious symbols such as the hijab has resulted in Islamophobia and microaggressions, both explicit and implicit. These biases may manifest as differential treatment, disproportionate criticism, or exclusion from educational interactions, as seen in Maryam's case. There was an awareness that such behaviors create an unequal learning environment where Muslim students may feel unwelcome or unfairly scrutinized, when contrasted to the lack of knowledge regarding procedures on bare below the elbows or religious headwear, which can manifest as implicit discrimination,

6.3.2 Low likelihood of reporting singular events

Participants discussed different levels of understanding around how students are often hesitant to report isolated incidents of bias or Islamophobia, fearing these may be dismissed as minor or unintentional. There was an appreciation that this reluctance leaves recurring issues unaddressed, as individual events may only appear significant when viewed collectively. Educators and institutions must emphasize the importance of reporting even singular incidents, as they contribute to patterns of discriminatory behavior. Clear and accessible reporting pathways, combined with normalizing their use, can empower students to address these experiences.

6.3.3 The importance of active bystanders

There was a good understanding among participants that creating a culture where peers and educators act as active bystanders will address Islamophobia and discrimination in real-time. Discussions around the cases showed that participants were generally aware that recognizing and intervening in subtle instances of bias can prevent such behaviors from continuing unchecked, with examples demonstrating how bystander student training has made positive inroads to developing a culture of respect and accountability in clinical education settings, promoting inclusivity and reducing the risk of harm to students like Maryam.

6.3.4 Intersectionality and the attainment gap

The session underscored how intersecting identities, such as race, gender, and religion, can amplify biases. For Maryam, being both a Muslim and a woman heightens her vulnerability to implicit biases in clinical settings. These compounded biases contribute to the attainment gap observed among minority students, negatively affecting their learning experiences and subsequent academic performance. The ensuing discussion amongst participants raised a level of understanding and awareness of the importance of addressing intersectionality, which is vital to creating equitable educational environments.

7 Discussion

This study offers significant insights into enhancing cultural awareness and humility among faculty in medical education through a student-led, faith-based CBL intervention. It demonstrates how lived experiences, when presented through a structured educational partnership intervention, can foster deeper empathy, stimulate institutional reflection, and encourage practical strategies for inclusion.

The findings of this study reinforce a growing body of literature supporting the use of CBL as a pedagogical tool to address EDI in health professions education. CBL facilitates structured, experiential learning and promotes critical reflection in safe environments, particularly when grounded in real-life scenarios involving marginalized learners (36). This intervention contributes further evidence that CBL can be successfully adapted for faculty development, particularly when the content is co-designed with students and rooted in lived experience.

The study also supports existing research highlighting the potential for student-led educational initiatives to inform and reshape institutional practice. Prior work by Nazar et al. (37) underscores the value of student-led diversity education in decolonizing curricula, revealing how learners can expose epistemic biases and prompt institutional reform. Similarly, Mind the Gap (38) exemplifies how student-initiated resources can challenge clinical teaching norms and promote more inclusive, representative practice. These interventions, like the one evaluated here, highlight how students—when positioned as co-educators—can drive pedagogical innovation and contribute to the creation of culturally safe learning environments.

By placing students in facilitative roles and using authentic case studies, this model challenges traditional hierarchies and repositions students as educators—an approach mirrored by Gallier-Birt et al. (39) and Warnock et al. (40), who found that student-led EDI training fosters dialogue, reflection, and meaningful changes in staff awareness and behaviors. This study strengthens that evidence base, demonstrating how such peer-to-staff training can be scaled within formal medical school structures. Similarly, Davis et al. (14) describe a student–staff partnership at Warwick Medical School to revise and decolonize CBL case content, illustrating how learners can drive curriculum reform by integrating perspectives historically excluded from mainstream medical narratives.

Moreover, this intervention addresses a critical gap in the literature around structured, faith-sensitive approaches to support Muslim medical students. While previous efforts, such as the Manchester Muslim Medical Student Guide (22), have highlighted key challenges and provided valuable resources, few educational interventions have translated this knowledge into faculty-facing training. This study offers a novel model that not only shares lived experiences but uses them to drive institutional action, aligning with wider calls to integrate cultural and religious competence into EDI frameworks (28, 41).

The intervention aligns with broader inclusive curriculum frameworks that advocate for pedagogical reform through co-production, cultural humility, and systemic change. Lokugamage et al. (42) illustrate how student–staff partnerships can drive meaningful curricular reform in medical education, using case-based methods to center cultural safety, epistemic plurality, and learner voice. These principles are echoed in the Inclusive Higher Education Framework (43), which outlines key domains for advancing inclusive teaching practice. These include structures and processes, curriculum design and delivery, and community and belonging. All of these were addressed through the collaborative nature and objectives of this intervention.

7.1 Implications for practice

This intervention was shown to be effective in meeting its aims of improving understanding and cultural literacy relating to the barriers experienced by Muslim students. The implications for practice are summarized in Table 1, drawing together the barriers identified during the sessions as well as enablers which were identified.

The overwhelmingly positive feedback and actionable outcomes reported by participants affirm the intervention's effectiveness, and attest to the wider use and exploration of student partnership models. Specifically, this intervention supports the use of CBL to deliver sensitive, lived-experience-based content that promotes inclusion, empathy, and structural awareness. It provides a scalable model that can be adapted to other marginalized groups. Medical schools are encouraged to embed such interventions into faculty development programs, with formal recognition of student co-leads.

This intervention also reflects that institutional support is vital. Frameworks alone—such as those from the MSC and Advance HE—are insufficient without mechanisms to operationalize them, and support from individuals to overcome barriers that exist within educational systems. The results suggest that tapping into the deep expertise and lived experience that students possess, whilst offering them support to facilitate in safe, dialogical environments, is one such mechanism.

8 Conclusions and recommendations

This study demonstrates that student-led, case-based learning (CBL) can effectively enhance faculty understanding of the unique challenges faced by Muslim medical students. By centering lived experience and facilitating structured, dialogic learning, the intervention promoted cultural humility, disrupted hierarchical dynamics, and supported the co-creation of actionable strategies for institutional change. The overwhelmingly positive feedback and engagement from participants affirm the value of this approach in promoting inclusive educational practice and advancing equity within healthcare training.

In light of these findings, we propose "5 Points for Practice" in Figure 4. Medical schools should consider integrating student-led CBL into faculty development programs, formally recognizing student facilitators and embedding such interventions within broader EDI strategies. National bodies such as the Medical Schools Council in the UK are well-placed to support the development of co-produced, faith-inclusive training guidance. Future research should evaluate the long-term impact of these interventions on educator behavior and policy implementation, assess scalability across institutions and marginalized groups, and incorporate independent or participant-led analysis to enhance methodological rigor. Adopting such inclusive, experiential learning models is a critical step toward fostering culturally safe and equitable medical education environments.

Since the interventions, the authors have seen a series of actions take place. Figure 5 presents a potential pathway for how educational changes follow as a result of the interventions that have taken place. A clear sequence of impact was observed,

TABLE 1 Topics explored and solutions proposed from the CBL sessions to the challenges faced by Muslim medical students.

Challenge	Explored topics	Proposed solution (CBL outcome)
Socialization	Discussions centered on discomfort in alcohol-related social settings and strategies to create inclusive environments. Recognizing that such discomfort is not unique to Muslim students, the sessions emphasized the importance of accommodating diverse social preferences.	Supporting the growth of a Muslim student body that can advocate for itself and provide mentorship and guidance to other Muslim students. Having visible role models and a support community can empower students to navigate challenging environments. Establishing partnerships with organizations such as BIMA and university chaplaincies, which offer structured support for Muslim students and help address their unique needs within clinical and academic settings. Additionally, establishing a within-cohort Muslim student body would help provide students with familiarity and safe spaces to discuss concerns. Reported success with these bodies and faculty has resulted in the formulation of "Muslim Student Guidebooks", EDI training and community cohesion projects.
Limited prayer/Wudhu space availability	The necessity of accommodating students' needs for performing ablution (wudhu) and prayers was discussed, emphasizing the provision of appropriate facilities and break times.	Establish dedicated, well-equipped prayer rooms on campuses and hospitals.
Prayer logistics and scheduling conflicts for Jummah (Friday) prayer	The challenges of balancing prayer times with a demanding medical curriculum were explored, considering the variability of prayer times due to seasonal changes. Solutions included timetable adjustments and ensuring accessible prayer spaces.	Implement protected or flexible lunch breaks to allow attendance. Encouraging faculty to work with chaplaincy services. This can benefit students of all faiths, promoting a more inclusive teaching schedule.
Lack of faculty awareness of worship needs	Encouraging clinicians to recognize and support the religious needs of incoming doctors was emphasized, promoting the inclusion of religious considerations in onboarding processes.	Embed faith-based inclusivity training in EDI programs. Comprehensive Equity, Diversity, and Inclusion (EDI) training is a key strategy for reducing bias in clinical settings. Such training should address cultural humility, unconscious bias, and the impact of microaggressions. Additionally, it must consider the intersectionality of identity factors to show how overlapping biases can intensify their effects. Clear communication within clinical teams, particularly during handovers, should be made to accommodate the need for prayer breaks. This practice fosters a supportive environment while ensuring that patient care remained unaffected. There is currently a gap in Supporting Trainees Entering Practice (STEP) forms, which currently lack specific questions about religious requirements. Including such considerations in these forms could help address the holistic well-being of medical students and professionals. These findings emphasize the need for greater awareness and proactive measures to accommodate the religious practices of Muslim medical students, fostering an inclusive and supportive learning environment.
Inconsistent NHS "Bare Below the Elbows" policy		Standardize policy enforcement across NHS Trusts and ensure faculty awareness through training.
Microaggressions and islamophobia in clinical settings		Introduce Active Bystander Training and strengthen reporting systems for discrimination.
Students hesitant to request accommodations	Encouraging clinicians to recognize and support the religious needs of incoming doctors was emphasized, promoting the inclusion of religious considerations in onboarding processes.	Normalize faith-based discussions in medical education and establish clear institutional policies. Inclusion of religious needs into STEP forms for newly qualified professionals.
Modesty concerns in clinical skills session	The appropriateness of mixed-gender sessions and maintaining dignity during examinations were addressed, advocating for options that respect students' cultural and religious beliefs. Modesty in clinical skills sessions and appropriate attire in sterile environments were examined, highlighting the need for guidelines that respect religious practices while maintaining professional standards. The specific requirements for maintaining aseptic conditions while respecting religious dress codes were discussed, leading to recommendations for accommodating head coverings in surgical settings.	Provide curtains for privacy and use simulated patients for examinations requiring exposure.
Unclear Policies on Religious Attire in Theater		Raise awareness of NHS uniform policies (2020) and ensure consistent implementation across NHS Trusts. Raising awareness through training and publicity.

(Continued)

TABLE 1 (Continued)

Challenge	Explored topics	Proposed solution (CBL outcome)
Lack of transparent and effective reporting mechanisms for discrimination	Issues of Islamophobia in clinical environments were highlighted, underscoring the importance of reporting systems and the role of active bystanders in addressing discrimination.	Develop structured, well-publicized reporting mechanisms for students to report discrimination without fear of reprisal. Alongside fostering awareness and encouraging diverse representation, visible and effective reporting mechanisms are essential for addressing bias in clinical settings (33). Muslim students and other minorities must feel empowered that when they report instances of discrimination or prejudice, their concerns will be taken seriously and addressed promptly. Establishing transparent protocols for reporting, with clear, visible consequences for discriminatory actions, is critical for cultivating trust within medical education. When students see that reported incidents result in fair and consistent action, it can foster a safer and more inclusive learning environment. In addition, providing regular feedback on reported outcomes and processes—without compromising confidentiality—could further strengthen students' confidence in these systems. By making reporting mechanisms more accessible and maintaining transparency in response procedures, institutions can demonstrate their commitment to upholding equity, diversity, and inclusivity within medical training environments.
Limited awareness of diverse contributions to historical and modern medicine		Incorporate historical and contemporary contributions of diverse medical pioneers, including Muslim scholars like Ibn Sina (Avicenna) and Al-Zahrawi (Abulcasis), into medical curricula may help students and educators appreciate the diversity of thought that shapes contemporary medical practice and can foster a more inclusive educational environment (14, 43). Opportunities in elective modules.

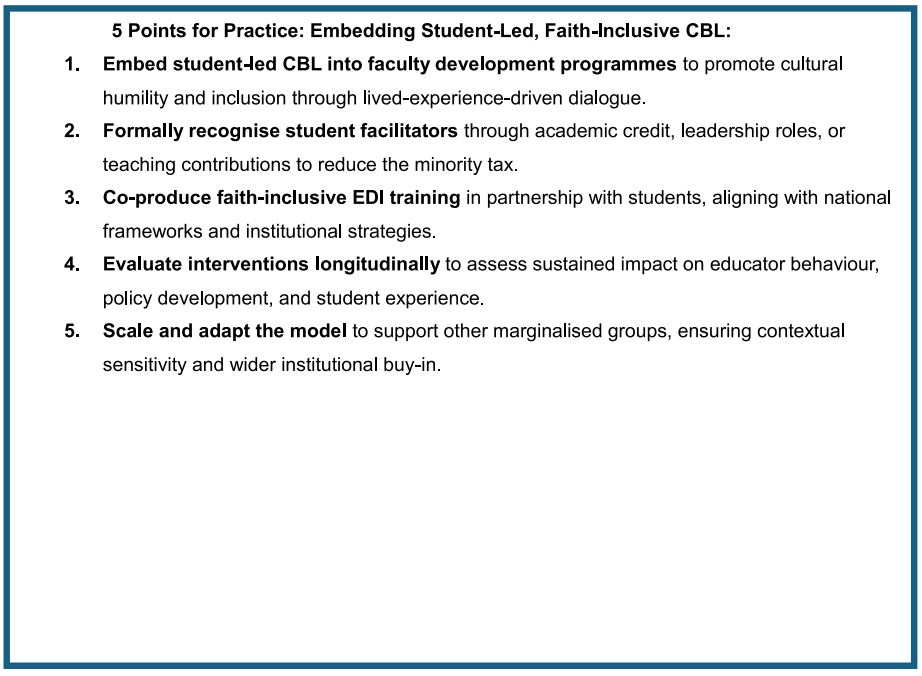

FIGURE 4
5 points for practice: embedding student-led, faith-inclusive CBL.

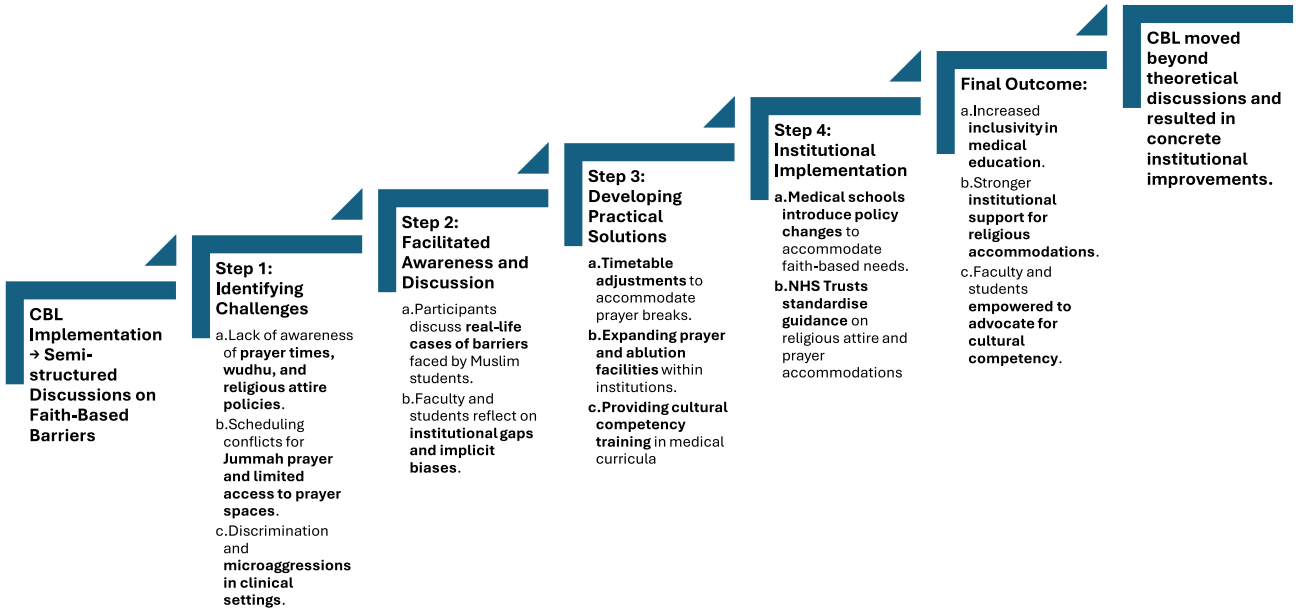

FIGURE 5
Flowchart of case-based learning (CBL) as an intervention for faith-based inclusivity in medical education. Challenges and solutions are explored in further detail in Table.

beginning with facilitated reflection, progressing through solution development, and culminating in institutional policy action. This stepwise process shows how student-led staff training is able to transition reflective dialogue to actionable outcomes—reinforcing CBL's role as a tool for both pedagogy and organizational transformation (14, 39).

8.1 Strengths

This study is the first of its kind to develop and evaluate a student-led, faith-based CBL initiative addressing the needs of Muslim medical students. Strengths include a scalable, replicable model of co-produced faculty development, alignment with national policy frameworks (e.g., MSC, UUK, Advance HE), and direct impact on educator practice. Notably, it was co-designed and facilitated by Muslim medical students with lived experience, positioning them as experts and allowing for the exploration of nuanced, real-world challenges often absent in traditional staff-led sessions. This student-led approach helped to rebalance faculty–student power dynamics and fostered a psychologically safe environment for open dialogue. The study employed a triangulated approach through multiple qualitative data sources that enabled a rich thematic analysis that strengthened the credibility and depth of the findings. The evaluation moved beyond simple participant satisfaction, reflecting a higher level of Kirkpatrick's framework (33) by capturing evidence of learning and intention to change practice, not merely feedback. Finally, the scalability of the intervention format was foregrounded through the deliberate choice of case-based learning (CBL), a pedagogical model familiar to both students and faculty in medical education, allowing potential application in different contexts internationally.

8.2 Limitations

The voluntary nature of participation likely introduced selection bias, with attendees predisposed to EDI engagement. The largest session drew from a single institution, limiting generalizability, although national conference participation mitigated this somewhat. Feedback was mostly oral and delivered in group settings, introducing potential social desirability bias. Thematic analysis was conducted by facilitators who also delivered the sessions, raising the risk of interpretive bias, albeit this was mitigated by following the Braun and Clarke framework for quality assurance (34). No formal follow-up was conducted to assess sustained impact or behavioral change. Future research should include longitudinal follow-up and involve institutional leaders to translate discussion into systemic change. Facilitator training should also address managing power dynamics in group settings to ensure equitable participation.

Data availability statement

The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research supporting data is not available.

Author contributions

ZM: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. HB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project

administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. LN: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. ER: Conceptualization, Funding acquisition, Methodology, Investigation, Resources, Supervision, Formal analysis, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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Kamran Sattar,
King Saud University, Saudi Arabia

REVIEWED BY
Dolana Mogadime,
Brock University, Canada
Rabia S. Allari,
Al-Ahliyya Amman University, Jordan

*CORRESPONDENCE
Himanshu Pandya
✉ dr_hvp@yahoo.com

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Workshop on professionalism and professional identity formation for newly recruited faculty at a healthcare university: lessons learnt

Himanshu Pandya[1]*, Jagdish Varma[2], Sarmistha Ghosh[3], Dinesh Kumar[4], Anusha Prabhakaran[2] and R. Harihara Prakash[5]

[1]Department of Medicine and Medical Education, Pramukhswami Medical College, Bhaikaka University, Anand, India, [2]Department of Psychiatry, Pramukhswami Medical College, Bhaikaka University, Anand, India, [3]Department of Health Professions Education, Bhaikaka University, Anand, India, [4]Department of Community Medicine, Pramukhswami Medical College, Bhaikaka University, Anand, India, [5]K M Patel Institute of Physiotherapy, Bhaikaka University, Anand, India

Background: Healthcare is inherently human-centered, and professionalism is crucial for improving healthcare systems. Traditionally developed through role modeling, professionalism now necessitates explicit teaching. Despite the inclusion of professionalism-related competencies by Indian regulatory bodies in medicine and nursing, its structured teaching remains limited. To address this, we introduced concepts of Professionalism and Professional Identity Formation (PIF) to newly joined faculty at our university, following established frameworks. This report details the workshop process and key lessons learned.

Methods: A six-member core faculty team with expertise in health professions education conducted a daylong workshop. The morning session focused on contemporary perspectives on professionalism, while the afternoon session addressed PIF. Anonymous post-session feedback was collected via Google Forms, with quantitative responses rated on a five-point Likert scale and qualitative feedback analyzed using Braun and Clarke's six-phase thematic analysis.

Results: Three workshops were held in June 2024 for faculty who had joined over the past 2 years. Attendance across the three sessions was 25, 23, and 24 participants, respectively, from medicine, physiotherapy, nursing, and allied health disciplines. Response rates for feedback were 80% (n = 20), 43% (n = 10), and 45% (n = 11). Fifty percent (n = 21) reported high satisfaction, 41% (n = 16) moderate, and 7% (n = 3) low. Participants noted shifts in their perceptions, recognizing professionalism as a learned skill rather than an inherent trait. Key takeaways included the significance of effective communication, empathy, and resilience in shaping professional identity. In terms of educational impact, participants intended to model professionalism, reinforce positive behaviors, and explicitly integrate PIF into their teaching. Proposed strategies included experiential learning, structured orientation, and active learning methods. The workshop was appreciated for its interactive elements, such as group discussions, case-based learning, and open forums. However, areas for improvement included better time management, concise delivery, enhanced multimedia use, and more structured engagement. Participants also suggested extending the workshop to resident doctors and a mixed audience of residents and consultants.

Conclusion: The workshop effectively conveyed professionalism and PIF concepts. Future iterations could benefit from refinements in structure and delivery, as well as audience expansion. Our experience may guide similar faculty development initiatives in other healthcare institutions.

KEYWORDS

faculty development, health professions education, professional identity formation, professionalism, workshop

Background

Since healthcare is essentially a human activity in midst of countless interactions guided by overarching ethos or value sets, professionalism and professional values have an important role in improving healthcare systems (1). Earlier, professionalism was considered to be mainly developed through exposure to role models. However, experts in health professions education have argued in favor of explicit teaching of professionalism (2). Erstwhile Medical Council of India (MCI) introduced AETCOM module in 2019 as part of Competency Based Medical Education (CBME) for MBBS students (3). Indian Nursing Council (INC) has listed competencies of professionalism, professional values and ethics including bioethics for B.Sc. Nursing students in its revised regulations and curriculum published in 2021 (4). While healthcare practitioners are required to adhere to codes of practice mandated by regulatory bodies, little attention is paid to the domain of professionalism during post-graduate training and Continuous Professional Development (CPD) activities organized by institutions providing health professions education and professional bodies, respectively. Healthcare practitioners therefore may not know what exactly professionalism means. Lesser et al. have proposed behavioral and systems view of professionalism as a practical approach to improve the delivery of healthcare (4). In addition to discourse on healthcare professionalism, the identity discourse is also coming to the fore, that emphasizes the importance of not just doing but also being. With the publication of Carnegie foundation report in 2010 on the future of medical education, the emphasis has moved from teaching of professionalism to supporting identity formation (5). In view of this shift, faculty development to promote Professional Identity Formation (PIF) becomes crucial strategy to facilitate the process of becoming and being a healthcare professional. The core purpose of our university has focus on providing modern and professional healthcare and resources (6). Therefore, recognizing the gap in structured training on Professionalism and PIF in postgraduate education and faculty development, we conducted this workshop to introduce these concepts to newly joined teaching faculty at our university. This initiative aimed to equip them with the knowledge and strategies needed to model and foster professionalism among learners. We report the process and lessons learned from a series of workshops.

Methods

Design

We adapted conceptual frameworks suggested by Levinson et al. and Cruess et al. for designing the workshop (2, 7) (Supplementary material 1, 2). Workshop activities were designed based on theories of cognitivism, constructivism, and social learning (8).

Setting

We conducted three iterations of the workshop on "Professionalism and PIF" in June 2024 at Bhaikaka University, a healthcare-focused university campus located in the semi-urban region of the state of Gujarat in western India. The university hosts a diverse group of undergraduate and postgraduate students across disciplines such as medicine, nursing, physiotherapy, public health, medical technology and allied health sciences.

Recruitment process

The inclusion criteria for participants of the workshop was recruitment over the previous 2 years across the constituent institutes of Bhaikaka University. There were no exclusions criteria. This group was purposefully selected as many of them might represent early-career faculty transitioning into academic roles, making them well-positioned to benefit from Faculty Development Program on Professionalism and PIF.

Planning of the workshop

A day-long workshop was developed by a core group of six faculty with expertise in health professions education and experience in conducting workshops on professionalism and PIF (9). Expected learning outcomes of the workshop were to: (1) describe behavioral and system approach to professionalism; (2) articulate the advantages of viewing professionalism as a multifaceted competency; (3) describe attributes and activities associated with personal wellbeing and resilience; (4) understand the concepts of personal and professional identity and socialization; (5) identify factors influencing socialization; and, (6) discuss personal and institutional strategies to support PIF. Faculty guides were prepared for the sessions. PowerPoint presentations were prepared to guide the flow of the sessions, along with instructions for small group activities. Narratives were provided as handouts to respective groups (7). While no prereading material was shared with the participants, post workshop handout on important concepts with suggested readings, was shared through WhatsApp group created for the participants.

Implementation of the workshop

Sitting arrangement for participants of the workshop included four tables arranged in a C-shape. Morning session of the workshop focused on newer perspectives about professionalism and the afternoon on PIF. Boxes 1, 2 show the structure of the workshop including the scenarios developed as physical handouts. The workshop featured a series of small group discussions, each followed by sharing of insight by each of the four groups in the large group. A facilitator guided the discussion for deeper understanding of newer perspectives of professionalism and concepts of PIF. For the session on Professionalism, each narrative (Supplementary material 3) had structured questions for the group to debate and present the resulting insight with the large group facilitated by one of the facilitators. For the session on PIF, group activities (Box 2) were followed by presentation of groups' insight with the large group facilitated by one of the facilitators. In the final wrap-up, participants were encouraged to ask questions and clarify concepts of professionalism and PIF.

Post-session feedback was collected using an anonymous google form. Feedback form included questions on degree of satisfaction with the workshop (Table 1). Three open-ended questions were included to elicit participants' opinions regarding the changes they would like to bring in their practice with students, to find out their key take-home messages and what did they find most interesting. The participants were also requested to provide any additional comments regarding the overall conduct of the workshop. Demographics were collected from attendance sheet for the workshop.

BOX 1 Activities of the morning session on professionalism.

Introduction: Icebreaking, workshop objectives.

Small group work: participants' discussion on four different scenarios* to develop viewpoints.

Large group discussion: participants' viewpoints shared in large group in serial manner for scenario one to four, each discussion followed by introduction of newer assumptions about professionalism by facilitator.

*Scenarios were adapted from Levinson et al. and focused on professionalism challenges and lapses in the clinical environment followed by questions (7).

BOX 2 Activities of the afternoon session on professional identity formation.

Group activity 1: Facilitator shared his personal and professional identities to facilitate understanding of the group work. Participants reflected on their own personal and professional identities and shared with a colleague detail about one of their identities. Subsequently, they shared their insights about identities in the large group. Facilitator defined identity, professional identity formation, physician's professional identity, socialization and communities of practice.

Group activity 2: Participants reflected on the factors that have influenced their own professional identity and which might influence the identities of their learners. Facilitator elaborated the concept of socialization and factors that influence professional identity formation.

Group activity 3: Participants identified personal and institutional actions to support professional identity formation in their institution. Facilitator elaborated on the principles of developing strategies to support professional identity formation.

Wrap-up: through questions and clarifications.

Analysis

The quantitative questions were analyzed using descriptive statistics (frequencies and percentages). The responses to the qualitative questions were analyzed thematically using Braun and Clarkes' six-phase approach (10). Phrases were used as the units of analysis. The descriptions of the themes are provided in the results section.

Results

The first, second and third workshops were attended by 25, 23, and 24 participants, respectively. Overall, 38 females and 34 males representing junior ($n = 71$) and middle ($n = 1$) level faculty participated in the three workshops. The participants were from medicine, physiotherapy, nursing, and allied healthcare disciplines. The response rates were 80% ($n = 20$), 43% ($n = 10$), and 45% ($n = 11$) in first, second and third workshops, respectively. Figure 1 shows the levels of satisfaction of the participants. The following themes emerged from the qualitative analysis.

Theme 1: changes in perceptions about personal and professional identity

Participants reflected on the impact of the workshop on their understanding of personal and professional identity. They recognized a shift in their perception of professionalism, personal identity and professional identity. The participants identified following key areas of understanding: assumptions about professionalism and role of effective communication and empathy. The following subthemes, supported by representative quotes, illustrate their insights.

Subtheme 1.1—new assumptions about professionalism

Participants developed new perspectives on professionalism, recognizing it as a learned skill rather than an inherent trait. They emphasized the importance of structured education over punitive measures in shaping professional identity. Additionally, they highlighted the role of socialization in forming professional values and distinguishing between personal and professional identity. The following quotes illustrate these evolving assumptions about professionalism:

> *"Professionalism needs to be taught and not caught."*
>
> *"Although it's caught but professionalism should be taught. Education is better over punishment…Socialization is where identities are formed."*
>
> *"Professionalism is a skill acquired over time and with experience."*
>
> *"Educational approach needs to be taken first rather than punitive approach."*
>
> *"Learnt about the difference between professional identity and personal identity."*

TABLE 1 Questions asked on the feedback form.

No.	Quantitative items	Rating scale
1	What is your overall satisfaction in the workshop?	3-point rating—High, Moderate, Low
2.	How satisfied were you with the logistics? A. Mode of Delivery B. Introduction to the session- Ground rules C. Wrap up D. Flow of event within session E. Duration of Workshop F. Session Content a) Pre reading materials b) Materials shared during session c) Hands on exercises—small group d) Follow up discussions in large group	5-point Likert scale 1 = least satisfied 5 = most satisfied
	Qualitative questions	
1	What changes are you likely to bring in your practice with students after this workshop?	Open ended
2	What were your key take away messages from this workshop?	Open ended
3	What did you find most interesting?	Open ended
4	What are your other comments about the overall conduct of the workshop?	Open ended

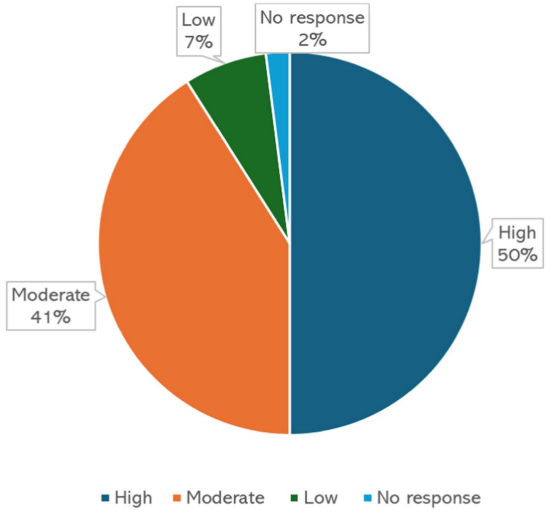

FIGURE 1
Level of satisfaction of all the participants from all 3 iterations.

Subtheme 1.2—the role of communication and empathy in professional identity

The participants acknowledged the essential role of communication in fostering inclusivity, compassion, and mutual understanding. They recognized that effective communication not only strengthens professional relationships but also contributes to overall professional growth. The following quotes highlight their commitment to enhancing their communication skills and creating a supportive work environment:

> *"I will strive to improve my communication skills by actively listening, articulating my thoughts clearly, and using appropriate body language."*

> *"Creating a supportive, inclusive environment is crucial for professional growth."*

> *"I learned how to navigate challenging situations with integrity and foster positive relationships with colleagues and clients."*

Theme 2: anticipated changes in educational practice

In response to the question "What changes are you likely to bring in your practice with students after this workshop?," thematic analysis revealed two themes about changes in their teaching practices and interactions with students.

Subtheme 2.1—professional development and identity formation

Participants recognized the need for a more explicit approach in fostering students' professional identity. They emphasized modeling professionalism, reinforcing positive behaviors, and guiding students in developing self-awareness regarding their professional growth. By actively demonstrating professionalism and appreciating good practices, they aim to strengthen students' professional socialization.

> *"I will use explicit approach while doing good practices, Appreciate good behaviour and practices of students in front of all students."*

> *"Teaching them the importance of professionalism."*

> *"Train students to identify their strengths and how they can turn their behaviours into professional identity."*

> *"The behaviour attribute, corrective and preventive action, telling them first the reason, and imbibing the professional identity."*

Subtheme 2.2—teaching strategies and methodologies

Participants highlighted their intent to modify teaching methodologies to better instil professionalism. They expressed a commitment to using a variety of pedagogical approaches, emphasizing experiential learning, observations, and active learning strategies such as seminars and workshops. Additionally, they acknowledged the need for structured orientation sessions to introduce students to professional expectations early on.

> *"I will try to make them learn through observations, seminars, or workshop and will arrange session on orientation regarding professionalism."*
>
> *"Foster a classroom culture that values respect, empathy, and inclusiveness."*
>
> *"Provide regular, detailed, and constructive feedback to students on their performance and professional behaviour."*
>
> *"Maintaining discipline and finding the cause whenever there is a lapse in professionalism."*

Theme 3—overall perception of the workshop

Many participants expressed positive feedback, indicating that the workshop was "good" or "interactive." The general sentiment was that the content was relevant and useful, as several respondents appreciated the structure and coverage of topics. Many participants found the discussions and deliberations particularly valuable and appreciated the interactive sessions namely group discussions, case-based learning, and open forum.

> *"Overall good."*
>
> *"Session was good."*
>
> *"This training should be done for all resident doctors, including first-year."*
>
> *"Session was very interactive."*
>
> *"All the facilitators facilitated the session in a very good manner and their discussion was to the point."*

Several participants provided neutral feedback, including responses such as "No," "None," or "No comments."

Theme 4: suggestions for improvement

Participants recommended ways and means to enhance the workshop experience. While they appreciated most aspects of the workshop, multiple areas of improvement were highlighted, namely related to delivery, content format, and engagement strategies. Each of the subthemes also shows the representative quotes to justify their statements,

Subtheme 4.1—time management issues

Some of the participants found the session lengthy. The participants suggested that structured time slots and short breaks in between talks could be introduced to avoid fatigue and ensure maximum engagement.

> *"Sessions should not go on for more than an hour. Everyone may not like."*
>
> *"…I found there were issues with time management."*
>
> *"Some of us got lost at times."*
>
> *"include some breaks with interesting activities."*

Subtheme 4.2—delivery style

The participants appreciated the overall delivery style, however few suggested to make sessions smoother and more engaging. They recommended concise delivery using different instructional methods to satisfy varied learners.

> *"Make it smooth and sharp, otherwise it's completely perfect."*
>
> *"The way of delivering the session in interactive manner has been great influence for me."*
>
> *"Session was very interesting and beneficial, content also good."*
>
> *"I personally feel that, it was good session with debates and discussions."*
>
> *"Reduce slide content."*

Subtheme 4.3—use of visual aids and interactive elements

The participants emphasized the need for more multimedia content to make sessions more engaging. Incorporating interactive elements such as videos, infographics, and case studies to make learning more dynamic. Few participants felt that humor and interactive activities should have been introduced to maintain interest and involvement and create a more relaxed learning environment.

> *"Lecture should include more images or videos."*
>
> *"Subject glossary or words used in this kind of workshop may be taught with examples, images, etc."*
>
> *"It should include more of photos rather than only written information."*
>
> *"Humor can free up boredom in these kinds of sessions."*

Subtheme 4.4—audience for future workshops

Participants suggested that this workshop should be planned and offered to a broader audience, with specific reference to the resident doctors. They also opined that a mixed group of residents and consultants should be offered such workshops together.

> *"This workshop should also be delivered to resident doctors."*
>
> *"More of such sessions should be taken, involving residents and consultants together."*

Discussion

The participants' feedback suggests that the workshop was effective at Kirkpatrick Model Levels I and II, achieving high participant satisfaction (reaction) and demonstrating evidence of learning (knowledge acquisition). The participants' insights and takeaways aligned closely with the workshop's intentions, particularly regarding professionalism and PIF, indicating that the workshop effectively fulfilled its objectives.

The conceptual framework suggested by Levinson et al. provided a practical approach to healthcare professionalism by framing professionalism as a set of observable and demonstrable behaviors (7). The approach helped in shaping participants' views about professionalism. An important learning among the participants was regarding the need for explicit teaching of professionalism and educational approach to handling professional lapses. They realized that professionalism is a set of knowledge, skills and behaviors acquired over time through experiences of navigating challenging situations. Through guided activities, participants gained insight into how professional identity is shaped through socialization. They recognized that professionalism is learned rather than a matter of innate character. With the change in perspectives about professionalism and insight about PIF, the participants expressed motivation to refine their classroom culture and pedagogical approaches.

Key factors facilitating participants' learning included interactive group discussions, reflective learning activities, and a balance of theory with practical examples. However, time management emerged as a challenge. Some participants felt that sessions were too long, possibly due to cognitive fatigue from dense content. They recommended structured time slots, short breaks, and the inclusion of humor or interactive elements to maintain engagement. While participants appreciated the overall delivery style, several of them recommended refining instructional methods to cater to varied learners. Suggestions included reducing slide content, integrating multimedia such as videos and images.

The participants also expressed interest in expanding the workshop's reach to resident doctors and consultants. Tailoring sessions for different faculty roles—including early-career educators, senior faculty, and clinicians—could improve relevance and engagement.

The findings align with prior research emphasizing the need for explicit professionalism education (11). The participants' responses indicate a shift in perceptions and a willingness to integrate new insights into their teaching practices.

This study highlights the effectiveness of a structured faculty workshop in fostering professionalism and supporting PIF. They were motivated to change their educational practices in the light of new insights. The study also indicated that institutions need to integrate professionalism training into ongoing faculty development programs with case-based interactive sessions to enhance engagement and retention.

BOX 3 Summary of recommendations for future workshops.

1. Sessions need to be more well-structured, concise, modular, engaging, and explanatory, with defined time limits and frequent breaks.
2. Sessions to include more visual content with use of use of images, videos, and real-life examples to support key concepts and maintain participant interest and create a more dynamic learning experience.
3. The workshop is to be planned in a suitable format to be offered to residents and consultants of various health professions, to broaden its impact, promoting knowledge-sharing across different levels of expertise.

Based on the feedback responses, a number of lessons have been learned which can be considered for future workshops on similar topic (Box 3). By implementing these changes, future workshops can become more effective, ensuring higher engagement and improved learning outcomes. Continuous evaluation and adaptation based on participant feedback will act as a key to optimizing future training sessions.

While many participants actively engaged in providing feedback, response rates in the second and third workshops were lower (43 and 45%). This indicates that some participants might be non-committal about their reactions to the workshop. It may also suggest that a few participants found the workshop unremarkable or not useful to their needs. The variability in response rates across workshop iterations poses a limitation, as it may affect the interpretation of participant experiences.

Additionally, since the study was conducted within a single institution, the generalizability of findings are limited. Future studies should consider multi-institutional evaluations and implement strategies to ensure more consistent response rates.

Conclusion

This workshop successfully enhanced faculty understanding of professionalism and PIF. Educators can adapt the framework used by us for teaching-learning of professionalism and PIF for undergraduate and post graduate students of health professions. Future research should examine the long-term impact of the faculty development workshop on professionalism and PIF on teaching behaviors and clinical practice. Providers of Continuous Professional Development (CPD) activities can also use this framework for practitioners.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by IEC-2, HMPCME, Bhaikaka University, Karamsad. The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from

the participants or the participants' legal guardians/next of kin because Anonymous feedback was collected.

Author contributions

HP: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing. JV: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Writing – original draft, Writing – review & editing. SG: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing. DK: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Writing – original draft, Writing – review & editing. AP: Conceptualization, Data curation, Investigation, Methodology, Resources, Writing – original draft, Writing – review & editing. RP: Conceptualization, Data curation, Investigation, Methodology, Resources, Writing – original draft, Writing – review & editing.

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EDITED BY
Francis Thaise A. Cimene,
University of Science and Technology of Southern Philippines, Philippines

REVIEWED BY
Yin Li,
Tianjin University, China
Teng Qi,
Northwest University, China

*CORRESPONDENCE
Lei Huang
✉ huanglei@tongji.edu.cn

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Association of critical thinking disposition with personality traits and differentiation of self in medical undergraduates, a multicenter cross-sectional study in China

Zixuan Zeng[1], Xiaohan Wang[2], Hengxing Sun[2], Jessica Thai[3], Yafen Gan[4], Enxiu Li[5] and Lei Huang[1,6]*

[1]Department of Psychiatry, Tongji Hospital, School of Medicine, Tongji University, Shanghai, China, [2]School of Medicine, Tongji University, Shanghai, China, [3]James A. Haley Veterans' Hospital, Tampa, FL, United States, [4]Gannan Normal University, Ganzhou, Jiangxi, China, [5]Medical College of Soochow University, Suzhou, Jiangsu, China, [6]Department of Medical Education, Tongji Hospital, School of Medicine, Tongji University, Shanghai, China

Background: Critical thinking is one of the seven essential competencies of the Global Minimum Essential Requirements in Medical Education. It is essential to cultivate medical students' critical thinking as it influences their clinical decision-making. The undergraduate years represent a critical period for medical students in terms of personality development and self-differentiation, which are essential foundations for shaping critical thinking. Therefore, this multicenter cross-sectional study aimed to explore the relationships of critical thinking disposition with personality traits and differentiation of self in medical undergraduates.

Methods: A total of 1,338 medical students from three institutions in China were selected for this study using a stratified cluster sampling method. The Critical Thinking Disposition Inventory-Chinese Version (CTDI-CV), Eysenck Personality Questionnaire (EPQ) and Differentiation of Self Inventory-Revised (DSI-R) were applied to assess medical students' critical thinking disposition, personality traits and differentiation of self. Multiple linear regression analysis was conducted to test the relationships of critical thinking disposition with personality traits and differentiation of self. Binary logistic regression model was established for sensitivity analysis.

Results: Linear regression analysis showed that psychoticism and neuroticism could negatively influence critical thinking disposition [β, 95% confidence interval (CI) = −0.363 (−0.411, −0.316); −0.129 (−0.189, −0.070)]. Conversely, extraversion and differentiation of self could positively influence critical thinking disposition [β, 95% CI = 0.145 (0.096, 0.194); 0.279 (0.224, 0.334)]. The results of the binary logistic regression were consistent with those of the linear regression model.

Discussion: This study suggested the potential need for tailored critical thinking development strategies for medical students with different personality traits and degrees of differentiation of self.

KEYWORDS

critical thinking, differentiation of self, medical students, personality, undergraduates

Introduction

Critical thinking (CT) is defined as an active mental process of purposeful and self-regulatory judgment, which entails interpretation, evaluation, analysis, and inference (1). Listed as one of the seven essential competencies of the Global Minimum Essential Requirements in Medical Education (GMER) by the Institute for International Medical Education (IIME), CT is essential for professional competence in medical students (2, 3).

According to Facione's self-regulation theory, physicians' CT includes critical thinking skills (CTS) and critical thinking disposition (CTD) (4, 5). CTD, considered a relatively stable personality-related trait, refers to one's intrinsic motivation to engage in thoughtful and reflective problem-solving (5, 6). It encompasses seven key dimensions: truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity. Prior studies have shown that stronger CTD is associated with higher self-esteem, academic performance, innovation, and clinical competence in physicians (7–14). CTD begins to form during undergraduate training, a critical stage in the development of clinical reasoning and decision-making abilities. Therefore, exploring the factors influencing CTD in medical undergraduates is vital for developing effective educational interventions. While previous research has focused on educational factors such as teaching methods and learning styles (15–18), recent studies highlight the importance of individual psychological characteristics (19–22).

Among individual traits, personality factors have attracted increasing attention. Eysenck's Personality Theory posits that personality traits can be categorized into three primary dimensions: extroversion-introversion, neuroticism-stability, and psychoticism (23). These personality traits influence learning behaviors and cognitive styles. For instance, extroversion is often linked with curiosity and openness to new ideas, whereas neuroticism and psychoticism are associated with emotional instability and rigidity (23). Fu and her colleagues found negative associations between neuroticism and psychoticism and CTS among Chinese nurses, while extraversion demonstrated a positive association (24). Similarly, other studies have indicated that medical students with personality traits such as extroversion, stability, flexibility, and agreeableness were more likely to become self-directed and independent thinkers (25–27). Despite this, limited research has explored the relationship between personality traits and CTD in Chinese medical students.

In addition to personality, differentiation of self (DS), a concept from Bowen's Family Systems Theory, may also influence CTD. DS is defined as individuals' ability to balance emotional and intellectual functioning, as well as intimacy and autonomy, within relationships (28). Bowen held that DS was one of the most important qualities for individual maturity and mental health, and it was a necessary growth goal for individuals and the family (28, 29). Those with higher DS tend to think objectively under stress and are less swayed by others' opinions—traits consistent with CTD (25, 30) Knauth and Shams found that the level of DS may influence the ability of social problem solving and the styles of decision-making in adolescents (31, 32). However, there has been limited research exploring the relationship between DS and CTD.

Personality traits and DS reflect two complementary aspects of individual psychological functioning—one rooted in temperament and cognition, the other in emotional regulation and interpersonal autonomy. Investigating their combined effects on CTD may provide a more comprehensive understanding of how individual factors shape critical thinking. In Chinese culture specifically, where collectivism and social harmony are emphasized, both personality development and DS may follow different patterns compared to Western populations (33, 34). These cultural influences may, in turn, affect the development of CTD among Chinese medical students. Therefore, exploring and understanding the relationship of CTD with personality traits and DS is crucial for designing targeted interventions to foster CTD among Chinese medical students.

To our knowledge, this is the first study to investigate the influence of personality traits and DS on CTD in medical undergraduates in China. This study has two hypotheses. First, medical undergraduates with higher levels of extroversion and lower levels of psychoticism and neuroticism traits are more likely to exhibit positive CTD. Second, the level of DS may positively influence CTD.

Materials and methods

Research design

This was a multi-center cross-sectional study conducted at three universities in China: Tongji University School of Medicine (Shanghai), Medical College of Soochow University (Jiangsu province), and Gannan Medical University (Jiangxi province). They reflect different institutional tiers within China's medical education system. This selection ensures that our sample captures a broad spectrum of medical students from different educational backgrounds, which enhances the generalizability and representativeness of our findings. The study was approved by the Tongji Hospital of Tongji University Institutional Review Board (Registration Number K-2014-020); Medical College of Soochow University Institutional Review Board (Registration Number SUDA20210122H02) and Gannan Medical University

Institutional Review Board (Registration Number 2014468). All respondents signed an informed consent form before participating in the investigation. This study was carried out and reported following STROBE statement (Supplementary Table 1).

Participants

In China, medical students typically complete a 5-year undergraduate education program to earn a Bachelor's degree. The study used a stratified cluster sampling method. Specifically, we aimed to sample approximately 80 to 100 students per grade (from grade 1 to grade 5) from each school. The eligible criteria were (1) medical undergraduates from the above three universities; (2) a major in clinical medicine; (3) willingness to participate in this research study.

Measurements

Critical Thinking Disposition Inventory-Chinese Version (CTDI-CV)

The Chinese Critical Thinking Disposition Inventory (CTDI-CV) was used to measure medical students' critical thinking disposition. It was translated and modified by Peng (35) according to Facione's (36) California Critical Thinking Dispositions Inventory (CCTDI). The CTDI-CV is a standardized 70-item multiple-choice test that examines seven dimensions of CTD including "Truth seeking," "Open-mindedness," "Self-confidence," "Inquisitiveness," "Cognitive maturity," "Analyticity," and "Systematicity." Each dimension contained 10 items, and each item was rated on a 6-point Likert scale. Varying from 70 to 420, a total score over 280 suggests a positive attitude toward CTD (35). The CTDI-CV demonstrated good reliability and validity, with an overall Cronbach's α of 0.90, sub-scale Cronbach's α ranging from 0.65 to 0.81, and a Content Validity Index (CVI) of 0.89 (35).

Eysenck Personality Questionnaire (EPQ)

The Eysenck Personality Questionnaire was compiled by a British clinical psychologist, Eysenck (23). The Chinese version of the questionnaire was presided by Gong (37). The number of items in the revised version was changed from 90 to 88 and includes 4 sub-scales: "Psychoticism" (EPQ-P), "Extraversion" (EPQ-E), "Neuroticism" (EPQ-N), and "Lying" (EPQ-L). In this questionnaire, participants were asked to answer yes (1) or no (0) to each item. The EPQ has been widely used among Chinese medical students (38). Since the EPQ-L was used to assess the reliability of participants' responses, the results of this dimension were excluded from the analysis in our study. The Cronbach's α of E, N, P were 0.83, 0.88 and 0.84, respectively. Test-retest reliability showed significant correlations (P: $r = 0.60–0.65$; E: $r = 0.58–0.86$; N: $r = 0.64–0.73$) (37).

Differentiation of Self Inventory-Revised (DSI-R)

The Differentiation of Self Scale Inventory-Revised, developed by Wu and Wang (39), was used to measure the differentiation of self in both intrapersonal and interpersonal dimensions. The DSI-R was translated and modified according to the Differentiation of Self Inventory (DSI) (40). This 27-item self-report questionnaire consisted of 4 sub-scales: "Emotional Reactivity (ER)," "I-Position (IP)," "Emotional Cutoff (EC)," and "Fusion with Others (FO)." It has been widely used among Chinese students (41). Each item was rated with a 6-point Likert scale ranging from 1 to 6. Higher total scores indicated better self-differentiation. The scale demonstrated good reliability with a Cronbach's α coefficient of 0.86, and sub-scale Cronbach's α values ranging from 0.62 to 0.77. The test-retest reliability for the total scale was 0.77 (41).

Covariates

Covariates include demographics that may have an influence on critical thinking disposition. We collected information on age, sex (male or female), school (Gannan Medical University, Medical College of Soochow University, Tongji university School of Medicine), year of study (from first to fifth), only child status in family (yes or no), whether students voluntarily majored in medicine (yes or no), and willingness to be a doctor in the future (yes or no). Age was divided into two categories (< 22 or ≥ 22) based on the average response value.

Statistical analysis

Descriptive statistics were computed using means and standard deviations (SD) as continuous variables, and frequencies and percentages as categorical variables. To compare CTD score differences between groups, we used two independent sample *t*-test or one-way ANOVA methods. Pearson's correlation was used to assess the degree of association among personality traits, DS, and CTD. Multiple linear regression was used to analyze the relationships between CTD, personality traits, and DS. While our sample includes students from three different schools, the primary focus of this study was to examine the overall relationships between these variables, rather than school-level differences. Therefore, treating the sample as a whole and applying multiple linear regression was a appropriate method to maintain statistical power and clarity in the analysis. Complementarily, binary logistic regression served as a sensitivity analysis by categorizing CTD scores into positive and negative attitude groups using a cutoff of 280 (35), offering predictive probabilities for binary outcomes and validating findings through alternative classification. Both regression models incorporated covariates. When examining the relationship between DS and CTD, demographics and personality traits were controlled as covariates. When investigating the relationship between personality and CTD, demographics and DS were treated as covariates. All statistical procedures were conducted using SPSS version 25.0. Two-tailed $p < 0.05$ was considered statistically significant.

Results

Participant characteristics

A total of 1,338 medical undergraduates were recruited for this study. The average age of the participants was 22.08 ± 1.74 years. Nearly half of the participants were male (49.8%) and the only child

(50.4%) in family. 295 (22.0%) were first year students, 252 (18.8%) were in their second year, 300 (22.4%) were in their third year, 289 (21.6%) were in their fourth year, and the rest were in their fifth year. More than half (56.4%) of the students chose to study medicine voluntarily, and most of them (91.1%) were willing to be a doctor in the future. Other details are shown in Tables 1, 2.

The mean ± SD scores of and EPQ.P, EPQ.E, EPQ.N, DSI-R, and CTDI-CV were 5.2 ± 3.24, 11.9 ± 4.45, 12.4 ± 5.14, 101.0 ± 14.26, and 287.2 ± 29.67, respectively. 772 (57.7%) participants had a CTDI-CV total score over 280, indicating a positive attitude toward CTD. In contrast, 556 (42.3%) had a negative attitude to CTD.

Differences between demographics and CTDI-CV total scores and attitude

Tables 1, 2 showed that participants under the age of 22, those who voluntarily chose to major in medicine, and those who expressed willingness to become a doctor in the future tended to have higher CTDI-CV total scores and a more positive attitude toward CTD (all $p < 0.05$). Although a significant sex difference was observed in attitudes toward CTD ($p = 0.037$), no significant difference was found in CTDI-CV total scores between males and females ($p = 0.096$). Students from different schools ($p = 0.008$) and years of study ($p < 0.001$) had different CTDI-CV total scores. However, there were no differences in CTDI-CV total scores or attitudes between students who were only children and those who were not ($p > 0.05$).

Relationship between personality traits, DS and CTD

The Pearson's correlation coefficients (Figure 1) demonstrated that CTDI-CV scores were significantly associated with EPQ.P, EPQ.E, EPQ.N and DSI-R scores ($r = -0.426$, 0.227, −0.319, 0.404, all $p < 0.001$). The results of Pearson correlation between personality traits, differentiation of self, critical thinking disposition and their sub-dimensions were displayed at Supplementary Table 2.

The multiple linear regression model showed that psychoticism and neuroticism could negatively influence with CTD [β = −0.426, 95% CI (−0.474, −0.377), $p < 0.001$; β = −0.319, 95% CI (−0.370, −0.268), $p < 0.001$]. Conversely, extraversion and DS could positively influence CTD [β = 0.227, 95% CI (0.175, 0.280), $p < 0.001$; β = 0.404, 95% CI (0.354, 0.453), $p < 0.001$]. After adjusting for the covariates, respectively, the relationships between psychoticism, neuroticism, extraversion, and DS remained nearly unchanged [β = −0.363, 95% CI (−0.411, −0.316), $p < 0.001$; β = −0.129, 95% CI (−0.189, −0.070), $p < 0.001$; β = 0.145, 95% CI (0.096, 0.194), $p < 0.001$; β = 0.279, 95% CI (0.224, 0.334), $p < 0.001$]. This suggested that psychotic and neurotic personalities may lead to weaker CTD, and extraverted personality traits may foster stronger CTD.

When we divided CTD into positive and negative attitudes and established the logistic model, the results suggested that higher scores of psychoticism and neuroticism could significantly negatively influence CTD [OR = 0.786, 95% CI (0.756, 0.818), $p < 0.001$; OR = 0.903, 95% CI (0.883, 0.924), $p < 0.001$] while higher scores of extraversion and DS could significantly positively influence CTD [OR = 1.089, 95% CI (1.062, 1.117), $p < 0.001$; OR = 1.053, 95% CI (1.043, 1.063), $p < 0.001$]. After adjusting for the covariates, respectively, the relationships remained unchanged. Overall, the results of the binary logistic regression were consistent with those of the linear regression model, indicating the robustness of the findings in this study. Details are displayed further in Table 3.

Discussion

The undergraduate years represent a critical period for medical students in terms of personality development and self-differentiation, which are essential foundations for shaping CTD. The cultivation of CT is crucial for their future careers. This study found that psychotic and neurotic personality traits were negatively associated with CTD, while extraversion was positively associated with CTD. These findings suggest the potential need for tailored critical thinking development programs for medical students with different personality traits. Furthermore, to the best of our knowledge, this is one of the earliest studies to explore the relationship between DS and CTD in medical students. The results indicate that individuals with higher DS scores tend to have higher CTD scores, suggesting that promoting DS in medical students may help foster their CTD.

In this study, medical students with higher levels of psychoticism tended to have lower levels of CTD, which is congruent with Zeng's (42) findings. This aligns with the Eysenck's Personality theoretical framework suggesting that psychoticism was associated with traits such as isolation, paranoia, and hostility, all of which could hinder the development of CTD (23). As Eysenck defined, psychoticism is "a dispositional variable or trait predisposing people to functional psychotic disorders of all types." Therefore, individuals with high levels of psychoticism may struggle with the objectivity, open-mindedness, and the systematic approach required for CT, as their emotional reactivity and lack of empathy may interfere with rational decision-making and collaborative problem-solving (43, 44). Additionally, medical students with elevated psychoticism may display resistance to feedback and a reduced ability to engage in self-reflection, which are essential for cultivating CTD (45). These results highlight the importance of early identification and targeted interventions for medical students with high psychoticism levels. Tailored educational strategies, such as reflective practice exercises could help mitigate the negative effects of psychoticism on CTD (46).

The negative predictive relationship between neuroticism and CTD observed in this study is consistent with findings by Buzduga (47), indicating that higher levels of neuroticism are linked to lower CTD. Medical students with high degrees of neuroticism tend to display emotional instability, excessive worry, and difficulties managing stress, which may impair cognitive flexibility and objectivity (48). Meanwhile, higher levels of neuroticism have also been shown to correlate with poorer mental health (49). Liu and colleagues suggested that mental health was associated with both CTD and CTS (50). This indicates that neuroticism may indirectly affect CTD by influencing mental health, underscoring the potential value of integrating mental health support into medical education to foster CT development. Programs focusing on stress management such as mindfulness-based intervention (MBI)

TABLE 1 Comparison of the CTDI-CV total scores according to demographics.

	Category	Overall (n = 1,338)			
		n (%)	Mean ± SD	t/F	p
Age					
	< 22	514 (38.4)	290.73 ± 28.65	3.46	0.001
	≥ 22	824 (61.6)	284.99 ± 30.10		
Sex					
	Male	667 (49.8)	285.8 ± 30.86	−1.67	0.096
	Female	671 (50.2)	288.5 ± 28.40		
School					
	Gannan Medical University	482 (36.0)	285.5 ± 29.72	4.81	0.008
	Medical College of Soochow University	388 (29.0)	285.2 ± 27.36		
	Tongji University School of Medicine	468 (35.0)	290.6 ± 31.19		
Year of study					
	First year	295 (22.0)	289.1 ± 27.00	6.76	< 0.001
	Second year	252 (18.8)	293.4 ± 29.37		
	Third year	300 (22.4)	285.8 ± 28.02		
	Fourth year	289 (21.6)	286.8 ± 32.10		
	Fifth year	202 (15.1)	279.5 ± 30.86		
Only child					
	Yes	674 (50.4)	287.7 ± 31.07	0.60	0.550
	No	664 (49.6)	286.7 ± 28.20		
Voluntarily majored in medicine					
	Yes	754 (56.4)	290.0 ± 29.36	3.94	< 0.001
	No	584 (43.6)	283.6 ± 29.71		
Willingness to be a doctor					
	Yes	1,219 (91.1)	287.8 ± 29.26	2.17	0.030
	No	119 (8.9)	281.6 ± 33.24		

CTDI-CV, Critical Thinking Disposition Inventory-Chinese Version; SD, standard deviation. Group differences were analyzed by two independent sample t-tests (dichotomous variables) or one-way ANOVA methods (polytomous variables).

may help enhance the ability to approach problems with greater critical thinking (51).

This study found that extraversion could positively influence CTD, which supports previous research findings that extraverted medical students may have more positive CTD than introverted students (52). Extraverted students tend to be more sociable, adaptable, and open to unknown knowledge and new experiences. These traits may enhance their curiosity and willingness to engage with diverse perspectives, enabling them to actively analyze and process new information (53). Consequently, these qualities may promote the development of positive CTD.

The results showed that DS could positively influence CTD among medical undergraduates. Three potential explanations may account for this finding. First, DS is closely linked to interpersonal relationships and communication patterns (54). Highly differentiated individuals are better at balancing personal boundaries and respecting others' opinions. This promotes diverse perspectives, helping individuals recognize unconscious biases and adopt more open-minded and tolerant outlooks, which are key traits of effective critical thinkers (55). Secondly, highly differentiated individuals tend to exhibit lower stress responses and more positive coping styles (56). Coping styles, defined as strategies used to address unexpected events, have been reported to be positively associated with CTD (57). Individuals with positive coping styles actively seek out and gather information, while taking personal responsibility, gaining self-confidence through successful experiences. This aligns with the "Self-confidence" dimension of CTD, playing a pivotal role in its development. Thirdly, highly differentiated individuals may have higher resilience and stronger emotional regulation abilities (58). Highly differentiated individuals are more resilient, adapt dynamically to challenges, and maintain composure, enabling them to think independently and exercise sound judgment in complex situations (59, 60). These traits are critical for the development of CTD. Medical education should therefore prioritize fostering both emotional and intellectual maturity to enhance students' abilities to think critically.

This study advances the theoretical understanding of CTD development by integrating personality traits and self-differentiation within the unique sociocultural context of Chinese medical education. Bowen's Family Systems Theory posits that DS

TABLE 2 Comparison of positive and negative attitude toward CTD according to demographics.

	Category	Positive CTD (n = 772)	Negative CTD (n = 556)	χ^2	p
		N	*N*		
Age					
	< 22	329	185	13.61	< 0.001
	≥ 22	443	381		
Sex					
	Male	366	301	4.35	0.037
	Female	265	406		
School					
	Gannan Medical University	270	212	3.45	0.179
	Medical College of Soochow University	216	172		
	Tongji University School of Medicine	286	182		
Year of study					
	First year	187	108	20.95	< 0.001
	Second year	161	91		
	Third year	173	127		
	Fourth year	159	130		
	Fifth year	92	110		
Only child					
	Yes	390	284	0.02	0.902
	No	382	282		
Voluntarily majored in medicine					
	Yes	477	277	21.92	< 0.001
	No	295	289		
Willingness to be a doctor					
	Yes	715	504	5.14	0.023
	No	57	62		

CTD, critical thinking disposition.

TABLE 3 Multiple linear regression and binary logistic regression models of CTD with personality traits and differentiation of self.

	Multiple linear regression		Binary logistic regression	
	Non-adjusted β (95% CI)	Adjusted β (95% CI)	Non-adjusted OR (95% CI)	Adjusted OR (95% CI)
EPQ.P	−0.426*** (−0.474, −0.377)	−0.363*** (−0.411, −0.316)[a]	0.786*** (0.756, 0.818)	0.803*** (0.769, 0.838)[a]
EPQ.E	0.227*** (0.175, 0.280)	0.145*** (0.096, 0.194)[a]	1.089*** (1.062, 1.117)	1.065*** (1.037, 1.095)[a]
EPQ.N	−0.319*** (−0.370, −0.268)	−0.129*** (−0.189, −0.070)[a]	0.903*** (0.883, 0.924)	0.959** (0.932, 0.987)[a]
DSI-R	0.404*** (0.354, 0.453)	0.279*** (0.224, 0.334)[b]	1.053*** (1.043, 1.063)	1.042*** (1.030, 1.054)[b]

The dependent variable of multiple linear models was the total score of CTDI-CV. The dependent variable of binary logistic regression was positive CTD (using negative CTD as a reference). [a]Adjusted for covariates, including age, sex, school, year of study, voluntarily majored in medicine, willingness to be a doctor, and DSI-R total score. [b]Adjusted for covariates, including age, sex, school, year of study, voluntarily majored in medicine, willingness to be a doctor, and total scores of EPQ.P, EPQ.E and EPQ.N. EPQ, Eysenck Personality Questionnaire; P, psychoticism; E, extraversion; N, neuroticism; DSI-R, Differentiation of Self Inventory-Revised; CTDI-CV, Critical Thinking Disposition Inventory-Chinese Version; OR, odds ratio; CI, confidence interval. $^{**}p < 0.01$; $^{***}p < 0.001$.

is a critical marker of emotional and cognitive maturity, enabling individuals to balance autonomy and intimacy while maintaining rational judgment (61). Our findings extend this framework by demonstrating that DS operates as a robust predictor of CTD in Chinese medical students, even after controlling for personality traits. This underscores the importance of fostering emotional resilience and boundary-setting skills in collectivist cultures, where hierarchical norms and group harmony are prioritized, potentially stifling independent thought (62). By highlighting DS as a modifiable target, our work suggests that interventions

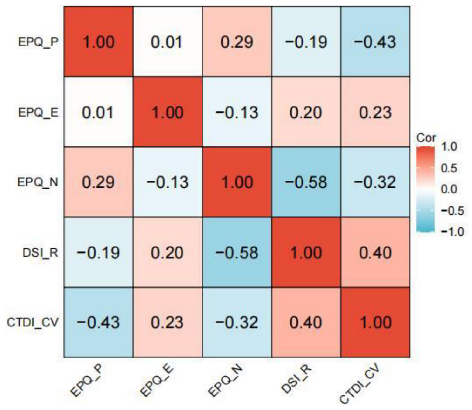

FIGURE 1
Heatmap of Pearson correlations among EPQ subscales, DSI-R and CTDI-CV total scores. EPQ, Eysenck Personality Questionnaire; P, psychoticism; E, extraversion; N, neuroticism; DSI-R, Differentiation of Self Inventory-Revised; CTDI-CV, Critical Thinking Disposition Inventory-Chinese Version; all $p < 0.05$.

promoting intrapersonal and interpersonal maturity, such as Balint groups or reflective practice training, could counterbalance cultural pressures that inhibit critical thinking.

The Balint Group, with its focus on offering a confidential and supportive environment for exploring professional beliefs, values, and emotions, may be an effective way to promote DS and CTD in medical students (63, 64). By encouraging personal reflection and addressing emotional and cognitive challenges, Balint Groups may enhance critical thinking and promote a more balanced approach to medical practice. This structured dialog enhances self-awareness, challenges unconscious biases, promotes cognitive skills, and ultimately fosters the development of DS and CTD. Research on Balint groups have observed that participants' empathy improved, defensive communication decreased, and clinical reasoning abilities increased, which is consistent with current research on CTD (65). Thus, incorporating Balint Groups into medical education could be a valuable strategy for nurturing both DS and CTD in future physicians. However, its implementation is still rare in Chinese medical undergraduates.

Cross-culturally, our results diverge from Western studies, where individualism and autonomy are more culturally sanctioned (66). For instance, while extraversion consistently predicts CTD across cultures, the strength of the DS-CTD association in our sample may reflect compensatory mechanisms in collectivist settings (67). Chinese medical students, socialized to prioritize group consensus, may rely more heavily on DS to navigate conflicting professional and familial expectations. Similarly, the pronounced negative effects of psychoticism and neuroticism on CTD align with Eysenck's model but may be exacerbated by cultural stigma around mental health, which could further impair critical engagement.

This study has several highlights. Firstly, this study represents the first attempt to our knowledge to explore the relationships among personality traits and differentiation of self and critical thinking dispositions simultaneously among medical students. Secondly, our sample was relatively large, and findings of this study proved stable through sensitive analyses. This study also had some limitations. Firstly, this was a cross-sectional survey, so no causality could be established between variables. Secondly, the use of self-reported assessments could reduce the data's validity. Future studies could consider adopting a longitudinal design and exploring the potential mechanisms of interactions among personality traits, differentiation of self and critical thinking.

Conclusion

This study highlights the significant role of personality traits and differentiation of self in shaping critical thinking among Chinese medical students. Our findings reveal that psychoticism and neuroticism negatively impact CTD, while extraversion and higher DS levels promote its development. These results underscore the importance of considering personality characteristics and emotional maturity in the design of educational strategies aimed at fostering critical thinking in medical education.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

This study has received ethical approval from the Tongji Hospital of Tongji University Institutional Review Board (Registration Number K-2014-020), Medical College of Soochow University Institutional Review Board (Registration Number SUDA20210122H02), and Gannan Medical University Institutional Review Board (Registration Number 2014468). Informed consent was obtained from all medical students involved in the study. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

ZZ: Formal Analysis, Methodology, Writing – original draft, Writing – review and editing. XW: Data curation, Formal Analysis, Writing – original draft. HS: Writing – review and editing. JT: Writing – review and editing. YG: Investigation, Supervision, Writing – review and editing. EL: Investigation, Supervision, Writing – review and editing. LH: Conceptualization, Funding acquisition, Investigation, Methodology, Supervision, Writing – original draft, Writing – review and editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that no Generative AI was used in the creation of this manuscript.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmed.2025.1561786/full#supplementary-material

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EDITED BY
Kate Owen,
University of Warwick, United Kingdom

REVIEWED BY
Musarrat Maisha Reza,
University of Exeter, United Kingdom
Dominic Wiredu Boakye,
University of Exeter, United Kingdom

*CORRESPONDENCE
Enam Haque
✉ enam.haque@manchester.ac.uk

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Mind your language: enhancing medical student learning during non-English language consultations

Enam Haque*, Thulasi Naveenan, Genevieve Shimwell, Jasmin Farikullah, Rachel Lindley and Helen Marsden

Division of Medical Education, School of Medical Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester, United Kingdom

General Practice provides an excellent opportunity for students to see patients with undifferentiated presentations and to acknowledge how General Practitioners (GPs) deal with medical complexity, uncertainty and psycho-social issues facing patients. It is essential that students have experience of diverse patient groups, using interpreters to help with language barriers. However, many practices have GPs that speak multiple languages, and patients appreciate the opportunity to speak their own language. The challenge for students is understanding what is happening when observing these consultations. The Community Team in a UK medical school was aware of the issues, through student evaluation data. To address this, they developed a protocol to support GP Clinical Placement Supervisors (CPS) to ensure the best clinical experience for their students, particularly in practices where consultations were not commonly delivered in English. This work developed into CPS training delivered locally and nationally at other medical schools in the UK. It also led to development of an experiential learning session, where students attended a practice with non-English consultations in the morning, and then reflected on the experience in the afternoon. It now forms a core part of the student curricular content in the Year 4 GP block. This paper highlights the journey to ensure that students can have meaningful learning, in environments where language may be a perceived barrier. It has enabled our students to appreciate the diversity and rich culture of our patients and take forward the learning gleamed from the complexities of non-English consultations.

KEYWORDS

diversity, diversity and inclusion, communication skills, ethnic minority health, GP placements, undergraduate medical education

Introduction

The United Kingdom is an increasingly diverse country to live in, with 18.3% of the England and Wales population are currently non-White, an increase from 14% in 2011 (1). 8.9% of residents are also reported to have a non-English language as their main spoken language, although only 17.1% of these are not proficient in English and only 3.1% cannot speak English at all. The main non-English languages spoken are Polish, Romanian, Punjabi, and Urdu. In Wales, the Welsh language is spoken by 17.8% of people aged three and over (2).

Despite the UK growing ever more multicultural, many ethnic minority groups in the UK face socioeconomic disadvantage, due to structural racism and other factors, leading to health inequalities (3). Al Shamsi et al. (4) conducted a systematic review looking at language barriers and found a negative impact for both patients and clinicians. This included stress and poor decision making and management for clinicians, and access barriers and dissatisfaction with healthcare for patients. Communication errors were found in a study to be a major contributor in almost 70% of adverse patient events and limited English proficiency (LEP) in another study led to more emergency readmissions, greater adverse events, and poorer patient experiences (5, 6). Fox et al. (6) found that over 50% of secondary care staff in the United States of America did not feel able to form good therapeutic relationships with patients with LEP. In a study by Pandey et al. (7), patients felt that language barriers led to them struggling to access services and to build rapport with providers, while healthcare providers were concerned that language barriers negatively impacted patients' management of their health, leading to worse health outcomes. A patient study assessing language services provision in primary and hospital care in Manchester reported "communication difficulties" as the greatest barrier to healthcare access at multiple points along their journey from booking appointments, during consultations and when obtaining informed patient consent (8).

Background and rationale

The General Medical Council (9) in their Good Medical Practice document have outlined "*You must take steps to meet patients' language and communication needs, so you can support them to engage in meaningful dialog and make informed decisions about their care.*" This is addressed through use of interpreters and the NHS commissioning guide for translation services states that "*Patients should be able to access primary care services in a way that ensures their language and communication requirements do not prevent them receiving the same quality of healthcare as others.*" (10) Using interpreters has been shown to positively impact on consultations with patients who do not speak a native language, with the greatest benefit from a professional interpreter being in the same room as the clinician (11). Conversely, staff working with asylum seekers in UK primary care services noted the negative impact on patient safety of inadequate interpreter provision, when patients relied on family members, hand gestures and apps as a "workaround" (12).

Freeman et al. (13) conducted a cross-sectional survey of consultations in non-English languages between patients and clinicians and found that patients benefited from this. Patients have commented positively on clinicians speaking the same language as them, with some actively seeking professionals with these qualities (7). However, Matras and Gaiser (8) interviewed bilingual General Practitioners (GPs) and noted their reluctance to consult in their "home language." GPs felt it changed the dynamic and expectations of the consultation, with negative outcomes for both patient and practitioner. They saw the greater value in having multilingual staff working in reception and administrative teams to help patient's overcome barriers. Additionally, Maul et al. (14) found that there was little in the way of an objective decision-making process to help bilingual staff to decide whether to use an interpreter or rely on their own skills.

Addressing language barriers is one part of improving consultations with patients from ethnic minority backgrounds. Another is ensuring that the clinician applies cultural humility in the interaction. Tervalon and Murray-García (15) defined cultural humility as "*a lifelong commitment to self-evaluation and self-critique, to redressing the power imbalances in the patient-physician dynamic.*"

General Practice (GP) is a rich environment for undergraduate medical teaching. A systematic review noted that clinical experience in the community provided more learning opportunities, and a chance for students to explore social and cultural factors affecting a patient (16). It is becoming increasingly important that UK medical students and educators have the tools to maximize learning experiences in consultations where a non-English language is spoken. A recent focus group looking at medical student experiences of interpreter consultations, suggested the need for more cultural awareness and training for medical students to work with interpreters in medical programmes (17). McEvoy et al. (18) developed structured teaching for students on speaking with patients with limited English, and using interpreters, and noted students felt better prepared after the session.

Description of the case

The University of Manchester MB ChB programme operates over a wide geographical footprint for student placements across the Northwest of England. 18.3% in the city where the medical school is located do not speak English as their main language, which is twice the national average. 18.4% of the city's population feel they cannot speak English well, with the top three languages spoken being Urdu, Arabic and Polish (19). In contrast, 98.4% of the population in rural Derbyshire, where students also attend placements, speaks English as their main language. The University of Manchester MB ChB Community Team noted, in student written evaluation data, that some GP Clinical Placement Supervisors (CPS) in ethnically diverse areas were consulting in non-English languages. However, student evaluation also revealed the challenge for them of not understanding the content of the GP-patient conversation, resulting in a negative experience for them. The "Mind your Language" (MYL) Protocol was developed to address this issue. The MYL Protocol is a guidance document developed by the Community Team in 2010, outlining to GP CPS how to maximize learning opportunities when students sit in non-English consultations. Here, we explore the development and application of the MYL intervention in creating a tailored CPS training workshop, aimed at empowering them to enhance the experience of medical students.

Materials and methods

Intervention design: mind your language training and educational package (protocol, training, resources and experiential learning)

The Community Team considered the easiest way to guide CPS to enhance student experience of non-English consultations.

They created a protocol which listed practical steps for the practice and CPS to adhere to, to ensure an excellent student experience (been submitted to UoM Figshare 10.48420/28926224). These were based on recommendations by the lead author, who successfully supervised students in a setting with a high number of non-English consultations. The protocol covered recommendations for before the student attends the practice, key areas to cover in induction, and essential tips before, during and after each consultation. The team followed up the protocol by developing a 75 min training workshop for CPS, covering the issues that students faced and solutions to enhance their experience. The main resource for the training consisted of two pre-recorded simulated videos in a non-English language, using actors. The first video script was based on student evaluation, which described the negative experience they had during the consultation. The second video script had the GP CPS applying tools from the MYL Protocol into the consultation, to enhance the student experience. CPS attending the training session were asked to observe the first video, as if they were students sitting in the consultation, and then to reflect and discuss their feelings of the experience. They then viewed the second video, which applied recommendations from the MYL Protocol, and reflected on whether their feelings improved observing this consultation. These videos with actors were conducted in a made up language. They were later deleted in 2022 as they were not felt to be authentic and replaced by new videos created with a real GP, real patient and a real language.

CPS recruitment to MYL training session

The MYL Training Session was delivered at the annual GP CPS Away Day in 2010. The Away Day was an opportunity for GP CPS to find out about changes in the MB ChB Programme, educator opportunities, continued professional development (CPD) and networking. The MYL Training Session formed part of a collection of workshops that GP CPS could pre-book for. The team wrote a workshop outline, explicitly stating that this was particularly for GP CPS to attend who consulted in non-English languages. Ten GP CPSs attended the session, and all were from practices where consultations could be in non-English languages.

Evaluation of intervention

GP CPSs who had attended the MYL Training Session, had good student evaluation scores (overall score 4.5/5 or above) and were located close to the medical school, were emailed an invitation to participate in an intervention evaluation study. We selected high scoring practices as we wanted to assess the intervention in a good quality learning environment. Three practices were recruited, and they were sent the MYL Protocol and a written briefing document outlining the intervention evaluation study and CPS/practice requirements before students attended. The briefing document provided clear instructions for the CPS to outline demographics of the practice population, including ethnicity, language, and any cultural issues during induction. It also advised that the CPS apply the MYL guidance to patient consultations. A key task was for each GP CPS to enable each student to speak to a patient themselves, with the GP CPS as the interpreter.

The MB ChB Programme in Year 3 in 2012 included 6 days in the Nutrition, Metabolism and Endocrine Module for students to attend structured teaching, as well as non-GP placements in the community. The non-GP placements were selected by students, who had the choice of a wide variety of placements. The authors included the MYL hybrid pilot in the menu of opportunities for students to select. Six Year 3 MB ChB students signed up to the pilot. They attended three local GP surgeries in the morning in pairs, where they observed GP consultations in non-English languages. They were provided with a worksheet, to enable them to reflect on their experience while on placement. The content of the worksheet can be found in the CPS Document, that was provided to CPS (10.48420/29023964 UoM Figshare- submitted here and awaiting confirmation).

Students then attended a group debrief session in the afternoon in the medical school. This session consisted of an opportunity for the students to verbally reflect on their earlier clinical experience in a protected small group setting. The session was facilitated by an experienced academic within the Community Team. This provided an opportunity to interrogate the experience and explore how effectively the MYL Protocol was implemented by the GP CPSs. Students were provided with printed copies of the MYL Protocol during the session, to help them with this exercise. The teaching also included the facilitator using PowerPoint slides to enable students to understand key concepts in equity, diversity and inclusion (EDI), exploring topics such as stereotyping and making assumptions. Written student evaluation of the intervention, completed after the teaching ended, stated that it helped to break down barriers when attending practices where patients consulted in non-English languages and positively improved their perceptions of attending such practices (add to UoM Figshare 10.48420/29024417- awaiting review). Table 1 shows the student evaluation of the GP placement, and Table 2 shows evaluation of

TABLE 1 Please rate the quality of the clinical placement- average 4.2/5 (5 out of 6 responses).

Likert score	Number of responses
Poor 1	0
Some concerns 2	0
Satisfactory 3	1
Good 4	2
Excellent 5	2

TABLE 2 Please rate the quality of the debrief teaching session- average 4.67/5 (6 responses out of 6).

Likert score	Number of responses
Poor 1	0
Some concerns 2	0
Satisfactory 3	1
Good 4	0
Excellent 5	5

the group teaching session. A Likert scale is used to score each intervention.

Expansion of the intervention

The MYL training package was originally developed as a training tool for GP CPSs. However, the authors realized that student experience in these consultations could only improve if they were empowered to challenge any barriers. They integrated the MYL protocol within online learning materials in the first week of the four-week Year 4 GP Block, with resources covering cultural humility and non –English speaking consultations. Students engaged with online learning while on their GP placement, in preparation for themed case discussion teaching at the end of the week.

The Community Team developed two recorded simulated consultations in Sylheti, a dialect of Bengali, in 2022. This was a new set of videos that were different to the original training videos. They involved a real GP and patient, as opposed to actors. An authentic language was also used, rather than a made-up language. The videos were created by the university filming team and consisted of two versions of the same consultation in a GP surgery, seen from the perspective of a medical student observing the interaction. The first consisted of a consultation without the GP applying the MYL protocol, and the second had the GP incorporating methods shared in the protocol. Students observed the first video and reflected on how they felt in this situation. They then viewed the second video and reflected on whether they felt better in this adapted consultation. There followed discussions about how students could ensure they could maximize their learning in these situations. They also had the opportunity to reflect on individual experiences of observing consultations in non-English languages.

It was essential to ensure that GP CPS responsible for delivering community placements were adequately trained in the practical implementation of the MYL protocol and were aware of its associated benefits. This was achieved through ongoing supervisor training delivered both in-person and through written materials on the online learning platform. Additionally, the MYL protocol was explored during triannual CPS development reviews in those practices with non-English consultations. This provided an opportunity for an academic with oversight of the practice, to review undergraduate supervision at both an individual and practice level. Annual CPS training days also incorporated the MYL protocol, to ensure that CPS and other staff were aware of its application in the clinical setting.

Positive takeaways of MYL

The MYL protocol was presented at the Society for Academic Primary Care (SAPC) North Conference in 2012, which generated interest from other medical school community teams. Given its innovative nature, the team were invited by colleagues in four other UK medical schools, to deliver the training to their GP CPS. These medical schools subsequently developed bespoke guidance for their CPS, with support of the Community Team.

Discussion

Future perspectives

The next step is for wider dissemination and uptake of the MYL protocol, contacting more practices with consultations in non-English languages, and inviting them to a bespoke training session. This would cover the MYL protocol and explore methods by which CPS could maximize the learning potential in the clinical setting, as well as gain feedback on their prior experiences. There needs to be robust evaluation of the impact of the GP CPS training sessions, through qualitative focus group analysis, as well as quantitative analysis of written evaluation.

The session should also include training on key equity, diversity, and inclusion (EDI) elements. such as applying cultural humility during supervision. This is advocated by the Medical Schools Council (MSC) in their guidance document, stating "*Curricula should also identify the impact that prejudice, bias, stigma and microaggressions have on students, staff and patients in healthcare environments and the impact this can have on the delivery of care*" (20).

The authors propose that the expanded version of the MYL training that includes students enables them to effectively consult with patients that only speak non-English languages. Bansal et al. (21) evaluated a consultation skills session using professional interpreters both as interpreters and simulated patients. This session improved student confidence in interpreter consultations and even benefited the GP tutor for future clinical practice. However, the authors suggested bilingual actors to play the simulated patient, as the interpreters found this challenging. A similar model could be incorporated into the themed case discussion teaching, utilizing bilingual actors only, and evaluating the impact through written evaluation. The MYL protocol, when used appropriately, bridges language barriers, fostering equitable patient-centered care whilst also including medical students into the consultation.

Conceptual or methodological constraints

The main constraints to wider expansion of the work include the reliance on engagement from GP CPS consulting in non-English languages. This would involve ensuring that they attend relevant MYL training and are open to applying the learning in the clinical context. Academics with oversight of relevant practices would also need to actively support the practices, to ensure they adapt their placements to enhance the clinical experience.

Another constraint is ensuring EDI training, particularly consulting with interpreters, is embedded into the medical programme. All medical programmes are constricted spaces, with different elements vying for space in the timetable. There would need to either be incorporation of the training into established communication skills teaching sessions, or negotiation to accommodate new teaching, at the expense of other structured

teaching time. Clinical years could offer greater flexibility, with the teaching replacing clinical experience time.

Data availability statement

The original contributions presented in this study are included in this article/supplementary material. The data is also available at repository Figshare at the University of Manchester (Mind your Language Protocol https://doi.org/10.48420/28926224.v1; student feedback https://doi.org/10.48420/29024417.v1; CPS document https://doi.org/10.48420/29023964.v1). Further inquiries can be directed to the corresponding author.

Author contributions

EH: Conceptualization, Methodology, Project administration, Resources, Supervision, Visualization, Writing – original draft, Writing – review and editing. TN: Writing – original draft, Writing – review and editing. GS: Writing – original draft, Writing – review and editing. JF: Writing – original draft, Writing – review and editing. RL: Writing – review and editing. HM: Writing – review and editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that no Generative AI was used in the creation of this manuscript.

Publisher's note

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