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Feasibility of Mixed Traditional Interview with Multiple Mini-Interviews for Internal Medicine Residency Admission

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ABSTRACT

This study aimed to evaluate the acceptability and reliability of the mixed traditional interview with multiple mini-interviews (TI-MMI) for resident selection in an internal medicine residency training programme. Data were collected from 34 applicants and 26 interviewers who participated in admission interviews for the training year 2024 of the Internal Medicine Residency Programme at Prince of Songkla University, Thailand. After the four-station mixed TI-MMI, applicants and interviewers were requested to complete an anonymous survey. Cronbach's alpha and intraclass correlation coefficients were used to evaluate the reliability. Our study showed that most applicants and interviewers considered the mixed TI-MMI a fair and more effective tool to evaluate applicant competencies and preferred the mixed TI-MMI to standard interviews. The interview station reliability (Cronbach's alpha) ranged from 0.50 to 0.953. Mixed TI-MMI scores demonstrated a significant positive correlation with grade point average ($r = 0.44$) and National Licence Examination (NLE) scores ($r = 0.57$). In conclusion, the mixed model of TI-MMI stations for resident admissions is generally feasible, acceptable, and reasonably reliable. However, validated studies should continue to identify the predictive validity of the mixed TI-MMI for selecting residents with the best fit for the programme.

Keywords: *Internal medicine, Residency admission, Multiple mini-interview, Reliability, Feasibility*

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INTRODUCTION

Admissions selection is crucial because of the limited number of positions in training programmes. Standardised test scores and grade point average scores (GPAs) may not predict attrition rates related to personal and non-cognitive traits, such as interpersonal skills and professionalism. The addition of interviews to academic metrics allows for the evaluation of applicant skills, including technical skills, empathy, compassion, ethics and professionalism, teamwork, and communication skills. These skills are crucial for healthcare professionals and can be better assessed through direct interaction (1).

Multiple mini-interview (MMI) is an alternative type of interview. It is an objective structured clinical examination (OSCE)-style interview station consisting of multiple and specific encounters to evaluate applicants' cognitive and non-cognitive skills (2). In general, MMI consists of 6 to 10 standardised situation-based interviews, including clinical-related scenarios, role-playing, and other specific questions. The MMI was designed to improve valid ratings of applicant performance and minimise the impact of individual interviewers (2). Previous studies have shown that MMI is more reliable than the traditional interview (TI) (3). The MMI process has demonstrated predictive validity for future clinical performance when used to enrol applicants (4).

A systematic review reported that the MMI used to select undergraduate health programmes was reasonable, feasible, acceptable, valid, and reliable (5). Another systematic review revealed that MMI is a non-biased, practical, feasible, reliable, and content-valid admission tool (6). The use of a hybrid model of TI with MMI stations provides more details for assessing undergraduate medical school applicants while acquiring equivalent data and applicant acceptability (7). Additionally, the hybrid traditional interview with multiple mini-interviews (TI-MMI) model may allow a more holistic interview approach for medical applicants (8).

However, the undergraduate and postgraduate doctoral admission processes vary. Postgraduate applicants are fewer and more homogeneous (9). The selection of applicants for a residency programme is an extensive process that involves evaluating them against predetermined criteria, including academic performance, interpersonal skills, and professionalism. Admission interviews are essential tools for assessing applicants before they enrol in a programme. The validity and reliability of the admission interview must be evaluated to determine its appropriate use if interview details are adopted in high-stakes admission decisions. The residency selection committee must ensure that the methods used to enrol applicants consider qualities that anticipate academic and career success. While MMI offers distinct advantages in mitigating bias and objectively assessing non-cognitive skills, TI remains a vital component of our evaluation process. It enables a continuous, holistic assessment of the candidate as an individual, providing deeper insight into their overall persona, compatibility with our institutional culture, and personal narrative.

These elements are instrumental in evaluating a candidate's suitability to succeed as an internal medicine resident at our institution. Therefore, faculty members decided to implement the mixed TI-MMI as part of the admission process to our Internal Medicine Residency Programme. TI enables applicants to exhibit distinctive attributes, whereas MMI stations allow the admissions committee to evaluate the skills necessary for the training programme and lifelong professional development.

This study aimed to identify applicants' and interviewers' perceptions of the acceptability and reliability of using the mixed TI-MMI as a selection tool for the internal medicine residency admission process.

METHODS

Study Design

This descriptive cross-sectional study was conducted among applicants and interviewers of the Internal Medicine Residency Programme at Songklanagarind Hospital, Hat Yai, Songkhla, Thailand, during the 2023 admission interview. All available data were included.

Interview Processes

The Prince of Songkla University's Internal Medicine Residency Programme interviews approximately 25–30 applicants per interview session annually. Interview scores constitute 45% of the final ranking score. Others were derived from numerical information summarising academic performance (i.e., grade point average [GPA], National Licence Examination [NLE] score), clinical reasoning test scores, and recommendation letters. The residency selection committee decided on the final admission in rank order to identify exceptional conditions, such as unprofessional behaviour.

Since 2017, our residency selection committee has transitioned from TI to mixed TI-MMI and has conducted interviews on a single day for all applicants. Before the interviews, the panel met to standardise the process, which involved defining candidate qualifications, creating structured questions and case scenarios, and establishing a scoring rubric to ensure consistency and objectivity. An overview of the mixed TI-MMI process, which consisted of four stations (one TI-format station and three MMI stations), is provided to the applicants on the interview day. The process includes four structured interview stations, each with a duration of eight minutes. Different scenarios are designed to test the following competencies such as communication skills, professionalism, ethical decision-making, handling stressful situations, data interpretation, and evidence-based medicine across four interview stations.

The differential weighting of the MMI stations reflects the programme's prioritisation of competencies deemed critical for success and retention in Internal Medicine residency training. Specifically, the general interview is assigned the highest weight (35%) to assess the applicant's overall suitability, communication skills, and professional demeanour, as these factors influence resident performance. Significant weightage is also allocated to dealing with stress (25%) due to the documented high-pressure nature of Internal Medicine Residency, which contributes to resident burnout and attrition. By prioritising this station, the residency selection committee and academic faculty aim to identify applicants with robust coping mechanisms. The remaining stations, ethical scenario and evidence-based medicine (EBM), are each weighted at 20%, ensuring that essential clinical reasoning and ethical judgement are assessed while placing greater emphasis on the interpersonal and resilience factors.

The variation in the number of interviewers per station is a deliberate design choice implemented to manage interrater reliability. While the final score for each applicant per station is calculated as the average of the individual marks awarded by all interviewers at that station, different staffing levels are used for methodological reasons. Stations with lower inherent subjectivity are selected by two interviewers. The general interview station utilises a higher number of interviewers to facilitate a more comprehensive and holistic assessment of an applicant's overall performance from multiple perspectives. Conversely, dealing with stress stations, which require subjective judgement of complex behavioural responses, utilises fewer interviewers to minimise the variability introduced by having multiple independent raters interpret subtle cues. This approach is used to achieve a more focused and reliable assessment of the high-stakes behaviour-based component.

Applicants may have significant levels of distress and difficulty in coping before the next station, which affects their performance when dealing with the stress stations. We propose that the sequence of stations considerably affects applicants' capabilities. In addition to an effort to interview all applicants on the same day, a modified version of the mixed TI-MMI was implemented to reduce stress and enable a more accurate assessment of their abilities. The

process comprises three consecutive 1.5-hour circuits. All applicants are randomly assigned to one of three groups. All applicants in each group rotate through four stations in each of the 1.5-hour circuits. Interviews are divided into two parts, with the stress station (Station 4) placed last for all applicants. Two groups of interviewers conduct the interviews in the first part (Stations 1 to 3). The applicants have an 8-minute break between stations to rest and prepare for the next station. After completing the first part of the interview, all applicants move to Station 4, where the interview is conducted by three groups of interviewers. Using this model, we conduct in-person interviews with 36 applicants during a half-day session.

Interview Stations

Station 1 (TI format station): Five interviewers who have reviewed the applicant's application before the interview conduct the general interview. A standardised question based on interpersonal competency is integrated into the TI station.

Station 2 to 4 (MMI station): The interviewers at each station include two to three faculty members. Faculty members blinded to the applicants' written applications evaluate the MMI stations.

Interviewer Selection

To ensure high interrater reliability during the pilot phase, internal meetings were conducted among the interviewers to develop interview questions and a standardised scoring rubric. Following this development, comprehensive rater training was provided to clarify scoring criteria and ensure consistent application. Interviewers receive this training before the MMI station activities and are equipped with a station-specific rating rubric. Each interviewer evaluates the applicants independently. Interviewer scores are collected at the end of the rotation to obtain the composite interview scores for each applicant.

Evaluation by the Applicants and Interviewers

After completing the mixed TI-MMI, both applicants and interviewers submit an anonymous survey, providing their respective background information and feedback on the process, to improve our internal procedures.

The questionnaire used in this study was adapted from those used in two previous studies on postgraduate medical admissions in Canada and Thailand (10, 11). To enhance clarity, the residency selection committee reviewed and adapted the questionnaire to ensure its content validity and language. The resulting instrument was formatted to optimise the clarity and flow for the respondents. Applicants were assured that the questionnaire would be voluntary, anonymous, and not part of the interview. Therefore, their responses would not affect their admission process. Applicants and interviewers reflected on their levels of agreement using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The overall impression of each step throughout the mixed TI-MMI was evaluated. Applicants and interviewers submitted their questionnaires via an online survey immediately after completing the interview.

Analyses

Descriptive statistics were used to analyse the overall mixed TI-MMI averages and applicant and interviewer evaluations. The scaled responses were analysed to determine participants' attitudes towards the interviews. An independent *t*-test and an analysis of variance were used to evaluate differences in interview scores among interview groups, as appropriate. We used Cronbach's alpha, a measure of internal consistency, to assess reliability. Cronbach's alpha should be > 0.70 ; thus, the tool was reliable. The intraclass correlation coefficient (ICC) was calculated to evaluate interrater reliability, with values < 0.5 , $0.5-0.75$, $0.75-0.9$, and > 0.90 , indicating poor, moderate, good, and excellent reliability, respectively (12). The correlation between interview and academic performance scores was calculated using Pearson's correlation coefficient. The R software was used for all data analyses. Statistical significance was set at an alpha level of 0.05.

RESULTS

For the training year 2024 intake, 34 candidates applied to the Internal Medicine Residency Programme. The demographic data for these applicants are presented in Table 1; all applicants were sixth-year medical students, and the majority (67.6%) were male. The programme does not utilise a quota system. Instead, applicants are ranked based on their total cumulative score, with the final number of accepted residents determined by the national authority's allocation of training positions. Ultimately, the interview cycle resulted in an acceptance rate of 18/34 (52.9%), and all successful applicants accepted the offer, with a 100% yield rate.

The interviews included 31 academic faculty members from the Division of Internal Medicine, as well as 28 interviewers and 3 administrators. This represented a participation rate of 49.2% of the total academic faculty members. All interviewers were Internal Medicine physicians with different specialities, including 6 (21%) junior staff, 12 (43%) mid-career staff, and 10 (36%) senior staff, with < 5 , $5-15$, and > 15 years of experience, respectively. We organised the interview panels to ensure a balanced mix of young, junior, and senior staff across all the stations. All participants attended preparatory training to familiarise themselves with the mixed TI-MMI process and station-specific rubric. An anonymous questionnaire was administered to 34 applicants (100%) and 26 interviewers (92.9%) after they completed the mixed TI-MMI.

Table 1: Demographic data of the applicants (n = 34)

Characteristics	n (%)
Gender	
Male	23 (67.6)
Female	11 (32.4)
Undergraduate medical school	
Prince of Songkla University	8 (23.5)
Other institutions	26 (76.5)
GPA (mean $\pm$ SD)	3.58 $\pm$ 0.23
NLE1 (mean $\pm$ SD)	220.8 $\pm$ 21.4
NLE2 (mean $\pm$ SD)	204.5 $\pm$ 19.8

Note: GPA: grade point average score; NLE: National License Examination score

Acceptability of the Mixed TI-MMI

Table 2 shows the acceptability of the applicants for the mixed TI-MMI in the selection of internal medicine residents. Most applicants (76.5%) preferred the MMI format to the TI format for residency admission. Applicants reported receiving adequate information before the interview (82.4%), being less biased by the MMI (73.5%), and having sufficient time to present ideas at each station (55.9%). Figure 1 shows the different agreement ratings for applicants' acceptability. Overall, the applicants' satisfaction score was 4.21 out of 5. No significant difference in applicants' acceptability was found among institutions ($p = 0.92$).

Cronbach's alpha coefficients were used to test the reliability of the questionnaires, with values of 0.922 and 0.862 for applicants and interviewers, respectively. These results indicate high internal consistency of the questionnaire.

Table 2: Applicants' responses to the acceptability questionnaire (n = 34)

Question	Mean $\pm$ SD
I have enough time to complete the task	3.77 $\pm$ 1.08
I could present my strengths effectively	3.91 $\pm$ 0.87
MMI is fairer than TI	4.06 $\pm$ 0.85
MMI is less stressful than TI	3.79 $\pm$ 1.01
I prefer MMI more than TI	4.06 $\pm$ 1.04
MMI could reduce bias	4.09 $\pm$ 1.03
MMI is more appropriate than TI	4.12 $\pm$ 1.04
The MMI process was clearly explained	4.29 $\pm$ 0.76
The interview content is appropriate	4.44 $\pm$ 0.66
The interview duration is appropriate	3.79 $\pm$ 1.10
The interview date is appropriate	3.94 $\pm$ 0.85
The room is appropriate	4.85 $\pm$ 0.36
The staff are helpful	4.85 $\pm$ 0.44
Overall, I am satisfied with the MMI process	4.21 $\pm$ 0.77

Notes: 1 = strongly disagree; 3 = neutral; 5 = strongly agree; MMI: multiple mini-interviews; TI: traditional interview

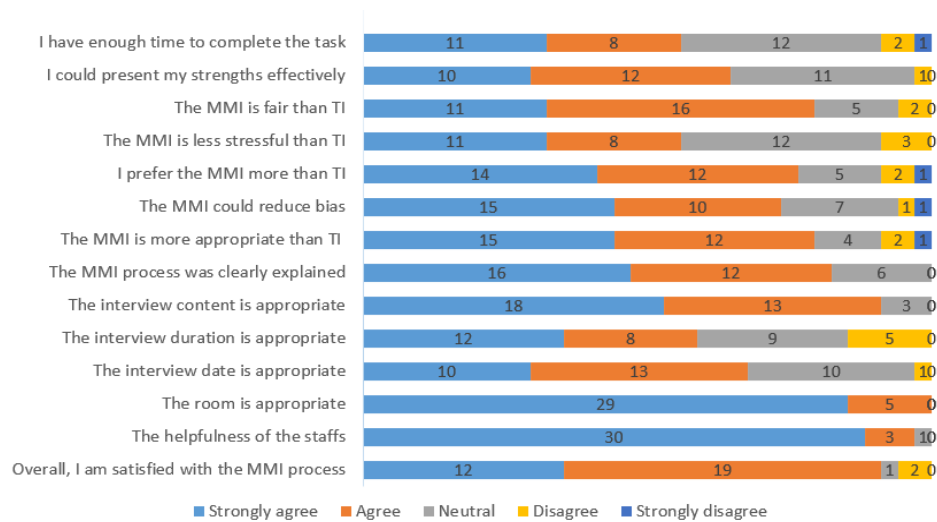


Figure 1: Acceptability of the interview process by applicants.

Interviewers reported they received adequate training before the interviews (65.4%), adequate time to assess applicants (65.4%), fair evaluation from the MMI (57.7%), and a scoring scale that enabled them to discriminate among applicants (61.5%) (Table 3). Figure 2 shows the different agreement ratings for interviewers' acceptability. Overall, interviewers' satisfaction score was 4.15 out of 5. No significant difference in acceptability was found between the interviewer seniority groups.

Table 3: Interviewers' responses to the acceptability questionnaire (n = 26)

Question	Mean $\pm$ SD
I think the applicants had enough time to complete the task	3.81 $\pm$ 0.69
The applicants present their strengths effectively	3.69 $\pm$ 0.84
MMI is less stressful for applicants than TI	3.69 $\pm$ 0.74
MMI is fairer than TI	3.65 $\pm$ 0.85
I received sufficient training before the interview	3.77 $\pm$ 0.77
I had sufficient time to evaluate each applicant	3.54 $\pm$ 0.91
The scoring form is appropriate	3.54 $\pm$ 0.86
I prefer MMI over TI	3.81 $\pm$ 0.90
The interview content is appropriate	4.00 $\pm$ 0.57
The interview duration is appropriate	3.73 $\pm$ 0.83
The interview date is appropriate	4.12 $\pm$ 0.65
The interview process was clearly explained	4.12 $\pm$ 0.71
The room is appropriate	4.35 $\pm$ 0.69
The staff are helpful	4.39 $\pm$ 0.70
Overall, I am satisfied with the MMI process	4.15 $\pm$ 0.73

Notes: 1 = strongly disagree; 3 = neutral; 5 = strongly agree; MMI: multiple mini-interviews; TI: traditional interview

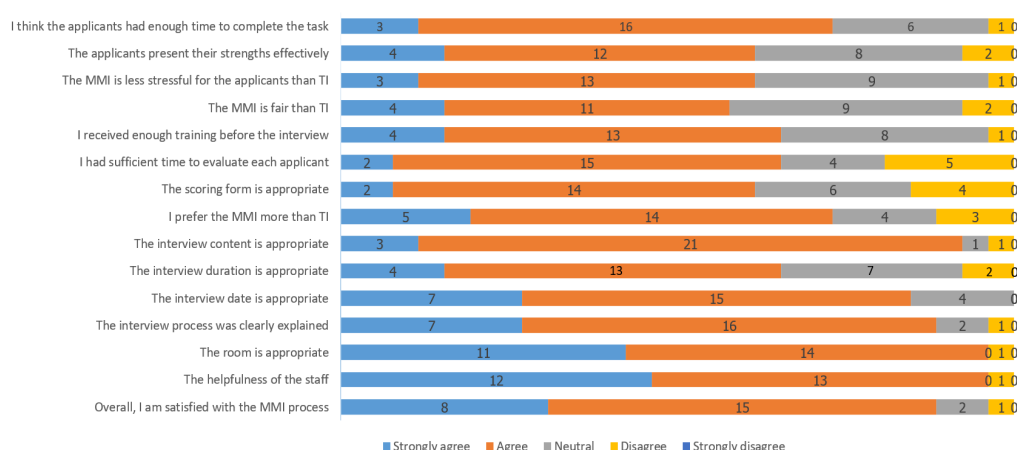


Figure 2: Acceptability of the interview process by the interviewers.

Interview Scores

No significant differences in interview scores were found between genders ($p = 0.41$) and between undergraduate medical schools ($p = 0.23$). The total interview scores were not significantly different between the groups of interviewers at any station ($p = 0.533, 0.731, 0.977$, and 0.715 , respectively).

Reliability

The ICC was used to estimate interviewers' interrater reliability (Table 4). Intraclass correlations ranged from 0.19 (ethical scenario) to 0.87 (evidence-based medicine). Cronbach's alpha coefficient was evaluated for each station's internal consistency reliability, with values of 0.861, 0.502, 0.953, and 0.733 for Stations 1, 2, 3, and 4, respectively, indicating an acceptable level of internal consistency.

Table 4: Internal consistency using Cronbach's alpha and intraclass correlation coefficients

Station	Title	Number of interviewers per station	Cronbach's alpha	ICC (95% CI; p -value)
1	General interview	5	0.861	0.51 (0.36–0.68; < 0.001)
2	Ethical scenario	3	0.502	0.19 (0.01–0.40; 0.02)
3	Evidence-based medicine	3	0.953	0.87 (0.79–0.93; < 0.001)
4	Dealing with stress	2	0.733	0.58 (0.31–0.77; < 0.001)

Note: ICC = intraclass correlation coefficients; CI = confidence interval

Correlation between the Mixed TI-MMI and Academic Scores

Pearson's correlation coefficient was used to investigate the relationship between the mixed TI-MMI scores and academic scores (Table 5). Positive correlations were observed between interview scores and GPA ($r = 0.44$) and NLE ($r = 0.57$). As expected, GPA was strongly correlated with NLE ($r = 0.77$). However, the clinical reasoning test only correlated with NLE ($r = 0.373$) and not with GPA or interview scores.

Table 5: Correlation between the mixed TI-MMI and academic indicators

Indicators	GPA	NLE	Clinical reasoning test	Interview
GPA	1			
NLE	0.773**	1		
Clinical reasoning test	0.182	0.373*	1	
Interview	0.437**	0.564**	0.083	1

Notes: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed); GPA = grade point average score; NLE = National License Examination score

DISCUSSION

Our study describes the development and implementation of the mixed TI-MMI in the resident selection process of an Internal Medicine postgraduate programme in Thailand. The admission interview requires a significant level of commitment, given the workload and responsibilities of the panel members. The TI process for 34 applicants would take approximately 17 hours, but the mixed TI-MMI required only 3.5 hours to interview all applicants. Our strategy of conducting a structured interview for all applicants, with a relative limit on participants' and the institution's time, indicates that the mixed TI-MMI is a feasible and practical admission tool for the Internal Medicine Residency Programme.

Both applicants and interviewers indicated a high overall acceptance of the mixed TI-MMI. Importantly, our study revealed no significant differences in applicant interview scores after accounting for applicant gender, undergraduate medical school, and interviewer seniority, indicating that a mixed TI-MMI can minimise bias.

Systematic reviews have revealed that MMI scores are not associated with academic accomplishment (13). However, most of these studies investigated associations at the undergraduate level, that is, at medical school admission. Several studies have reported that higher admission MMI scores predict better OSCE scores, licensing exam scores, and clinical clerkship ratings (14–16). Jerant et al. (17) proposed that better performance on the MMI indicates greater success in medical training. In particular, individuals with higher clinical performance levels were likely to perform better on the MMI. The current study revealed that GPA and NLE scores were the most significant predictors of selection for on-site interviews and admission to the Internal Medicine Residency Programme. A possible explanation is that our MMI was designed to assess the ability to apply medical knowledge to patient care dilemmas, clinical problem-solving, and data interpretation. Therefore, applicants with higher medical accomplishments tend to perform better on the MMI.

Typically, MMI consists of a series of 6 to 10 stations, but it varies between 3 and 12 (6, 18). Our study included only four stations due to limited time and resources. A previous study revealed that a four-station MMI was sufficiently reliable if context specificity, interviewer bias, and interviewer training were thoroughly accounted for (19). Our study demonstrated reasonable reliability in high-stakes decisions with fewer MMI stations, which may be suitable for residency programmes with fewer staff and resources for the interview process.

Internal consistency reliability was high at three stations (Cronbach's alpha > 0.7) and poor at one station (Cronbach's alpha of 0.502). Additionally, three of the four stations had moderate to good interrater reliability (ICC: 0.51–0.87), and only one station had poor reliability (ICC: 0.19), indicating that the mixed TI-MMI used for residency admission is generally consistent and reliable. Several potential reasons may explain the poor reliability of the ethical scenario

station. The main reason for this could be related to conflicts and dilemmas. This may have resulted in a less clear expression of applicants' ideas and a more complex judgment. Moreover, the interviewers were three staff members with varying levels of seniority, who may have had different interpretations of applicants based on their personal experiences. Other explanations include unclear interview questions and rubrics. The contents of this station will be revised before its next use.

The admissions committee needs to develop and implement additional training for interviewers to familiarise them with the process and evaluation rubrics, as well as specific interview questions aligned with the competencies being tested, to improve reliability. Moreover, increasing the number of MMI stations and reducing the number of interviewers per station would increase the reliability of MMI (9, 11). Previous studies revealed that increasing the number of MMI stations is more beneficial for reliability than increasing the number of raters per station (9, 18). A systematic review revealed an optimised reliability of MMI by including 7 to 12 stations with one rater per station (5).

This study has several limitations. This was based on our experiences at a single institution using our interview formats, which may prevent generalisation to other programmes. The number of applicants was also relatively small. In addition, we could not evaluate the scores of retained and rejected applicants based on an anonymous survey. Our study did not assess the predictive validity of the mixed TI-MMI model in training successful specialists. Follow-up studies would help determine the correlation between mixed TI-MMI scores and the accomplishment of residency training.

CONCLUSION

The mixed TI-MMI was implemented with good acceptability, feasibility, and reasonable reliability for selecting an Internal Medicine Residency Programme in Thailand. It does not appear biased towards applicants based on gender or institution. Therefore, the mixed TI-MMI can be replicated in residency admission interviews at other institutions.

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ETHICAL APPROVAL

Ethical approval was obtained from the Human Research Ethics Committee (REC.66-446-14-1) of the Faculty of Medicine at the Prince of Songkla University. No personal data were collected in this study. Neither the interviewer's nor the applicant's consent to participate was required, based on the study design.

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