Assessment of non-clinical attributes in paramedicine using multiple mini-interviews

Walter Tavares,[1,2,3] Justin Mausz[1]

[1]Centennial College, School of Community and Health Studies—Paramedic Program, Toronto, Ontario, Canada
[2]University of Toronto, Wilson Centre for Health Professions Education Research, Toronto, Ontario, Canada
[3]Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ontario, Canada

Correspondence to
Walter Tavares, Centennial College, School of Community and Health Studies— Paramedic Program, P.O. Box 631 Station A, Toronto, Ontario, Canada M1K 5E9; wtavares@centennialcollege.ca

ABSTRACT
Background Non-clinical attributes are increasingly emphasised as an important factor in paramedic practice. However, the assessment of these attributes often lacks the evidence base to support it. Exploring the relationship between non-clinical attributes and clinical skills is also of theoretical and practical importance.
Objective To first seek evidence of reliability and validity for the assessment of non-clinical attributes using the multiple mini-interview (MMI) in paramedic contexts and second, to explore the association between non-clinical attributes and clinical skills in paramedicine.
Methods Entry to practice level paramedic candidates completed a 10-station MMI to assess non-clinical attributes on day 1 and a 10-station simulation-based assessment (SBA) of clinical skills on day 2. Both were assessed using different global rating scales. Our primary outcomes included MMI inter-station reliability (calculated using generalisability theory) and Pearson's correlation between non-clinical attributes and clinically focused skills.
Results 30 trainees completed the MMI and 26 of the 30 completed the SBA. Inter-station reliability for the MMI reached 0.77. Pearson's correlations (disattenuated correlations in parentheses) between the overall MMI score and mean SBA global rating scores reached r=0.31 (r=0.48) and ranged by dimension from r=−0.11 (−0.17) (procedural skills) to r=0.54(r=0.83) (communication).
Conclusions The MMI demonstrated evidence of reliability and validity for the assessment of non-clinical attributes in paramedic contexts. Non-clinical attributes and paramedic clinical skills are likely distinct but related constructs, each contributing to the construct of paramedic practice. Programmes of assessment should include both to ensure the construct of paramedic practice is adequately represented.

BACKGROUND

Paramedicine has become recognised as a valuable part of the healthcare system mainly due to opportunities that exist as a function of having paramedics in the community and an evolving scope of practice.[1][2] This evolution has been mainly due to research exploring how new and expanding roles might be integrated into the larger multidisciplinary and holistic healthcare model.[1][3] Both traditional (ie, resuscitation/emergency based) and emerging roles (eg, extending healthcare to out-of-hospital settings) require the attention of educators, employers, licensing bodies and researchers to determine how to optimally select the best paramedic candidates for these roles. Traditionally, the focus has been mainly on foundational knowledge and clinically focused skills (eg, history gathering, patient assessment, clinical decision making and psychomotor skills).[4] While these continue to be priorities and help ensure technical competence, another area of focus that has emerged has been on *non-clinical* attributes, which include, broadly, elements of social intelligence and interpersonal qualities.

A number of sources describe the types of non-clinical attributes required of paramedics. For instance, research from the UK indicates that qualities, including honesty, empathy and professionalism, rank high among desirable paramedic qualities.[5] Similarly, research from Australia identified seven ideal characteristics for paramedics, first among these was 'personal behaviour and attitude'.[6] The Paramedic Association of Canada's National Occupational Competency Profile also identifies a number of non-clinical characteristics as being essential such as empathy, interpersonal communication, social and ethical responsibility, conflict resolution and assertiveness.[7] This suggests assessing candidates for these attributes is both desirable and appropriate. However, currently, non-clinical attributes are not included, developed or emphasised in many paramedic programme curricula, admission processes or entry to practice decision-making practices.[5] If they are included, the assessment of non-clinical attributes tends to lack the evidence base to support current practices.[8]

In other health professions, the shift from focusing exclusively on foundational knowledge and/or clinically focused skills to an appreciation of the importance of non-clinical attributes has led researchers to explore best practices related to the assessment of these attributes. One such strategy is the multiple mini-interview (MMI) which applies a multiple sampling approach to the traditional interview.[9] Similar to an objective structured clinical evaluation (OSCE), which has been used to demonstrate that multiple observations by multiple observers yields increased reliability and validity of assessment, the MMI immerses the applicant in a series of 'interviews' in which the candidate engages in debate, discussion or simulation-based interaction to elucidate selected non-clinical attributes (eg, communication, integrity and conflict resolution), with each station scored independently.[9] The MMI as an assessment tool has demonstrated evidence of reliability and validity[10][11] and has achieved growing consensus regarding its credibility, feasibility and acceptability.[12]

Research investigating the MMI in a paramedic context is lacking but so too is understanding of the exact relationship and interplay between non-clinical attributes and clinically related skills (often measured through simulation-based assessment

(SBA) like OSCEs). Exploring whether non-clinical attributes are related to or directly predictive of clinically focused skills is of theoretical and practical significance. For instance, a better understanding of the construct of paramedic practice may help optimise educational and/or selection/assessment strategies moving forward. Therefore, the purposes of this study are to seek evidence of reliability and validity for the MMI in paramedic contexts and to explore the association between non-clinical attributes and clinical skills in paramedicine.

MATERIALS AND METHODS
Overview of study design
To evaluate the psychometric properties of the MMI in a paramedic context and to explore the relationship between non-clinical attributes and clinically focused skills, paramedic trainees at the end of their training (ie, at the entry to practice level) completed two assessment processes over 2 consecutive days. Based on earlier research that suggests context specificity can be adequately addressed when using between 8 and 12 cases,[9] [13] we designed a 10-station MMI to assess non-clinical attributes for day 1 and a 10-station SBA of clinical skills for day 2. Our primary outcomes included reliability associated with the MMI and the correlation between MMI and SBA scores (overall and by dimension). This study took place at the Centennial College Simulation Centre (Toronto, Ontario, Canada). Ethical approval for this study was provided by Centennial College REB (REB#155).

Study participants
Convenience sampling was used to recruit paramedic candidates who were at the end of their training, nearing certification exams and who had not worked as independent clinicians. Our intention was to inform entry to practice level decision-making assessment processes (eg, employers and licensing bodies) and to understand the construct of paramedic practice at this point of development. Therefore, this group of participants aligned well with our study purpose.

Materials
Multiple mini-interviews
The interview cases/scenarios used in this study were selected from an available database of existing cases (authored by McMaster University and ProfitHR). Each case engaged the candidate in a discussion, debate or role designed specifically to assess non-clinical attributes, including self-awareness, responsibility, communication, ethical and moral judgement, teamwork, conflict resolution, problem solving, critical thinking and management skills. Copies of the interview stems for the 10 cases used in this study are provided in appendix A (web only file).

A strength associated with the MMI is the ability to include interviewers with varying expertise, perspectives and backgrounds. Therefore, interviewers were selected by the research team with the intention of including a broad range of backgrounds and expertise from a variety of stakeholder groups (eg, licensing bodies, employers, educators, lay public, other health professions and non-clinicians/managers). Prospective interviewers were recruited through professional contacts held by the research team. There were no specific inclusion or exclusion criteria to be included as an interviewer. Instead, we aimed for breadth in the interviewer pool.

Interviewer training was provided by the research team using pre-existing training materials authored by ProfitHR. The training consisted of a 1 h self-directed online training module that interviewers were required to review prior to the testing day,

which outlined the overall process, interviewer expectations and general guidelines regarding scoring. In addition, a 1 h orientation was provided on the day of the MMI, which included a review of the testing process, logistical considerations (eg, timing), description of the testing materials (eg, stem, background and theory) and rating scale. No effort was made to calibrate the interviewers. Instead, interviewers were simply given time to review the interview/case details and were instructed to follow the guidelines provided.

All station rating scales included four common items (communication skills, strength of arguments, suitability for paramedicine and overall) scored on a seven-point adjectival global rating scale (GRS). Each number on the seven-point scale was anchored by a descriptive statement (1=unsuitable, 2=minimally acceptable, 3=below average, 4=average, 5=above average, 6=strong performance and 7=outstanding performance).

SBA of clinical skills
Content for the SBA was selected from a bank of existing cases authored by the Centennial College Paramedic Programme that had been used in other high-stakes SBAs (although novel to the group of participants included in this study). These were initially developed based on actual clinical cases and blueprinted to ensure broad sampling of patient types and conditions, skills and attributes associated with the field of paramedicine. Each case was reviewed for clarity, completeness and appropriateness by the research team prior to inclusion in the study. A final content map is provided in appendix B (web only file).

Raters for the SBA were recruited from a pool of raters who were involved in the paramedic programme at Centennial College, from surrounding paramedic programmes and active clinicians. To be included as raters, the individuals must have been an active paramedic or active in paramedic education and have had experience with summative assessment of paramedic candidates in either simulation or work-based settings.

Raters were asked to assess each candidate using a GRS designed to assess paramedic clinically focused skills.[14] This GRS includes seven dimensions (situation awareness, patient assessment, history gathering, decision making, resource utilisation, communication and procedural skills) scored on a seven-point adjectival scale. This GRS has demonstrated evidence of high inter-rater reliability, intra-rater reliability discriminant validity and concurrent validity when used in similar settings.[14] [15]

Minimal rater training was provided to the raters in the SBA. This included an overview of the process, cases and GRS, instructions on how to apply the GRS and general guidelines regarding the assessment of paramedic candidates in a simulation-based setting. There was no attempt made to calibrate the raters.

Procedures
All paramedic candidates at the entry to practice level in the paramedic programme offered jointly by Centennial College and the University of Toronto (n=40) were invited to participate in this study. Following recruitment, ensuring informed consent and completion of a demographic information form, participants were assigned to a 10-station MMI on day 1 and a 10-station SBA of clinical skills on day 2 (next day). Participants were provided with an overview of both processes, randomly assigned a starting station and start time for each day. Each MMI station was scheduled for 8 min with 2 min to rest and review the next station's stem. Each station included one interviewer and a standardised actor (as necessary). For the 10-station SBA of clinical skills on day 2, participants followed a

similar process except instructions were to read 'call information' prior to beginning the clinical interaction and each station was 12 min in length with 5 min to rest between stations. Each station included one rater and a standardised 'patient', 'bystander' and a 'partner' (as necessary).

Data collection

Demographic data were collected prior to commencing the study. For both the MMI and the SBA, all scores were collected using a paper-based format. Interviewers and raters were instructed to complete the rating scale following each interaction. Scores were then transferred to an Excel spreadsheet in preparation for analysis. Paper-based surveys exploring the MMI process specifically were distributed to interviewers and participants immediately following the assessment process.

Data analysis

Descriptive statistics were used to report on demographic information for interviewers, raters and participants where appropriate. Based on earlier research that has identified high inter-item correlations when using similar MMI rubrics, we first conducted an item analysis on the MMI rubric used in this study to determine whether or not it was worth treating items independently. Next, we calculated the reliability for the MMI and SBA using generalisability theory.[16 17] Reliability analyses provide an indication of the ability to consistently differentiate between candidates and serve as a measure of the degree of error impacting upon the scores (ie, a quality index).[18] Values can range from 0 to 1 with higher values representing higher reliability. Generalisability theory uses analysis of variance procedures to determine what proportion of the variance can be attributed to each variable included in the study (interviewees being the variable of interest, other variables and interactions representing various sources of measurement error). These proportions can then be used to calculate reliability but also to conduct decision studies (D-studies) that can inform future users of the MMI with meaningful recommendations towards achieving optimal reliability.

Pearson's correlation was used to explore associations between settings. As less than perfect reliability can attenuate observed correlations,[19] we also calculated attenuation-corrected estimates of the correlations between settings. This allowed us to consider a more accurate estimation of the underlying association between observations by correcting for measurement error.

Finally, while face validity is limited in its contribution towards evidence of construct validity, the MMI would be novel in many paramedic contexts and, therefore, may prove useful. Interviewer and participant survey results were analysed with descriptive statistics to assess face validity.

RESULTS

All data were collected over 2 days in March of 2013. Thirty paramedic candidates completed the MMI on day 1 (75% of all eligible students) and 26 of the 30 completed the SBA process on day 2. Complete demographic details for the participants, interviewers and raters are included in table 1. Importantly, no one person served as both interviewer and rater.

Item analysis

Using scores provided by the interviewers on the four common items (communication, strength of argument, suitability for paramedicine and overall) across stations, an item analysis was conducted and revealed inter-item correlations ranging from 0.72 to 0.91. The inter-item correlation between the item 'overall' and the remaining three items ranged from 0.80 to

0.91. As a result, for the sake of simplicity, we used the scores assigned on the 'overall' item as our measure of performance on the MMI. We will refer to this score as MMI-overall herein. See table 2 for the correlation matrix.

MMI reliability

Generalisability theory was used to calculate inter-station reliability for the MMI using the MMI-overall scores. A review of the variance components revealed 22.2% of the total variance was attributed to the trainees, 54.1% attributed to the interaction between trainees and cases and only 16.5% attributed to unidentified sources of error. Using these variance components, we calculated an inter-station generalisability (ie, reliability) coefficient of 0.77 when scores are aggregated across the 10 stations. These results suggest that interviewers were able to differentiate between trainees. Second, the relatively high proportion

Table 1 Demographic data for participants, interviewers and raters

Item	Participants n=30	MMI raters n=10	OSCE raters n=10
Age, years (mean, SD)	23.7 (3.9)	39.2 (8.7)	33 (9.4)
Men (%, n)	58.1% (18)	40% (4)	50% (5)
Women (%, n)	41.9% (13)	60% (6)	50% (5)
Highest education (%, n)			
High school	58.1% (18)		
College	3.2% (1)		
University	38.7% (12)		
Graduate school	0% (0)		
Familiarity with MMI (mean, SD)	2.4 (2.1)		
Familiarity with GRS (mean, SD)			4.0 (2.2)
Professional designation			
Primary care paramedic		10% (1)	40% (4)
Advanced care paramedic		30% (3)	60% (6)
Registered nurse		10% (1)	0% (0)
Other*		50% (5)	0% (0)
Professional experience (years; mean, SD)		8.2 (8.9)	9.3 (7.94)
Employer			
Paramedic service (six represented)		60% (6)	100% (10)
Hospital (not EMS)		20% (2)	0% (0)
Other†		20% (2)	0% (0)
Previous MMI interviewer		10% (1)	
Previous experience interviewing paramedics		50% (5)	
Previous experience interviewing other healthcare workers		20% (2)	
Previous training/education in interviewing		40% (4)	
Previously assessed paramedic clinical performance			90% (9)
Years assessing clinical performance (mean, SD)			5.1 (5.07)

Familiarity with MMI, 10-point scale used, 1=not at all familiar, 10=very familiar.
Familiarity with GRS, 10-point scale used, 1=not at all familiar, 10=very familiar.
*Professional designation 'other' included one Sunnybrook faculty; one Sunnybrook manager; one supervisor of paramedic education; one specialist of paramedic education; and one registered social worker.
†Employer 'other' included two representatives from the Sunnybrook Centre for Prehospital Medicine in Toronto.
EMS, emergency medical services; GRS, global rating scale; MMI, multiple mini–interview; OSCE, objective structured clinical evaluation.

Table 2 MMI scoring rubric inter-item correlations

Items	COM	SOA	SFP
Communication (COM)			
Strength of argument (SOA)	0.72		
Suitability for paramedicine (SFP)	0.78	0.84	
Overall (OVR)	0.80	0.84	0.91

MMI, multiple mini-interview.

of variance attributed to the interaction between trainees and cases provides evidence that context specificity (ie, variability in performance across different cases) was the largest threat to reliability but adequately addressed using 10 stations. A D-study revealed that adding two additional cases would result in a reliability of 0.81. A similar analysis was conducted for the SBA using the scores assigned on the 7-dimension GRS. Reliability in this setting reached 0.55. See table 3 for details regarding individual variance components for both the MMI and the SBA.

Correlation between non-clinical attributes and clinical skills

Using MMI-overall scores averaged over 10 interviews and the mean GRS score over 10 stations for each participant, a bivariate scatter plot was first created to confirm linearity and identify outliers. One extreme outlier was identified in the GRS scores (ie, >1.5× the IQR) and the data for that individual were removed.[19] No outliers were identified in the MMI data. A Pearson's correlation was then calculated and reached $r=.31$ ($p=0.07$). This correlation reached $r=0.48$ when the two sets of scores were disattenuated for imperfect reliability. When the same analysis was calculated between MMI-overall score and each individual GRS dimension, correlations ranged from $r=-0.11$ (procedural skill) to $r=0.54$ (communication; $r=-0.17$ to $r=0.83$ for the same dimensions when disattenuated). See table 4 for a summary of correlations by dimension. To be certain, we repeated the analyses using all items on the MMI rating tool and found (as expected given the high inter-item correlations) the same pattern or results.

Survey results

Survey questions and results are presented in tables 5 and 6. Generally, interviewers reported the MMI was appropriate, feasible and effective for selecting paramedic candidates for a

Table 3 Generalisability study results with sources of error, calculated variance components and percentage of total variance attributable to each source

Source of error	MMI		SBA	
	Variance component	Per cent of total variance	Variance component	Per cent of total variance
Trainee	0.43	22.2	0.10	5.4
Case (includes interviewer/rater)	0.11	5.7	0.00	0.0
Items	0.00	0.0	0.08	4.3
Trainee×Case	1.05	54.1	0.61	33.8
Trainee×Item	0.00	0.0	0.04	2.2
Case×Item	0.03	1.5	0.09	4.8
Trainee×Case×Item	0.32	16.5	0.94	50.5

MMI, multiple mini-interview; SBA, simulation-based assessment.

variety of purposes. Participants were mainly neutral in their views regarding feasibility, appropriateness and effectiveness, but reported an MMI would not prevent them from applying to paramedic programmes for training, emergency medical services for employment or base hospitals for certification/licensure.

DISCUSSION

As paramedicine continues to evolve, the community has increasingly focused on the importance of non-clinical attributes (ie, soft skills) as an essential element of paramedic practice. This ongoing reframing of what defines paramedic practice, especially as it relates to the role of non-clinical attributes and how they might be linked to clinical skills is not well understood. As a consequence, decisions regarding admissions, entry to practice or certification/licensure are often void of assessments of non-clinical attributes despite being critical. If non-clinical attributes are assessed, the assessment process is often implemented without the necessary evidence base to support it.[8] The purpose of this study was to critically appraise the use of an MMI as a method of assessing non-clinical attributes in paramedic contexts but also to explore in what way non-clinical attributes might be associated with paramedic clinical skills in an effort to further inform the construct of *paramedic practice*. The results of this study suggest that the MMI is a reliable and valid measure of non-clinical attributes in paramedic contexts, and that non-clinical attributes (as measured by an MMI) and clinical skills (as measured using a GRS in a SBA) are moderately associated.

For paramedic educators, employers and licensing bodies interested in assessing non-clinical attributes, the results of this study support the growing body of literature that suggests the MMI is both a reliable and valid measurement strategy for that purpose.[10 12 20] The reliability achieved (0.77) was slightly higher than the average reliability (0.73 with 12 stations instead of 10) observed across a number of studies (n=8).[21] The strength of the MMI was once again its ability to adequately address the effect of context specificity (ie, that performance on one task is a poor predictor of performance on another); the largest threat to reliability.[9 22] In addition to adequate reliability, evidence of validity was observed in the form of convergent and divergent validity, as well as face validity. That is, we observed higher associations between settings on items that were similar (both the MMI and the GRS had items defined as 'communication') and lower associations between settings on items that were conceptually and practically dissimilar (eg, MMI-overall and procedural skills). With regard to face validity, which speaks to the acceptability of the process to some extent (but not necessarily scientific evidence of construct validity), responses from both the participants and the interviewers suggested that the MMI would be an appropriate, acceptable and effective tool for assessing non-clinical attributes. Together these results support the use of the MMI for the assessment of non-clinical attributes in paramedicine.

Importantly, the correlation between non-clinical attributes and clinical skills was similar to previous research exploring similar associations.[10] However, the majority of this earlier research has involved assessing candidates at the point of admission to professional programmes and then years later using similar SBA (eg, OSCE-based licensing exams). This study uniquely and intentionally measured both non-clinical attributes and clinical skills during the same time period at the end of training in order to better understand how both might inform *paramedic practice* and each other. The associations observed between settings suggest non-clinical attributes and clinical skills

Table 4 Pearson's correlations between MMI scores and SBA–GRS scores, with disattenuated correlations in parentheses

MMI items	GRS dimensions							
	GRS-AVG	SA	PA	HG	DM	RU	COM	PS
OVR	0.31 (0.48)	0.23 (0.35)	0.23 (0.35)	0.19 (0.30)	0.33 (0.51)	0.20 (0.31)	0.54 (0.83)*	−0.11 (−0.17)

'*' Indicates statistical significance at the 0.05 level.
COM, communication; DM, decision making; GRS, global rating scale; GRS-AVG, global rating scale average of all dimensions; HG, history gathering; MMI, multiple mini-interview; OVR, MMI-overall; PA, patient assessment; PS, procedural skill; RU, resource utilisation; SA, situation awareness; SBA, simulation-based assessment.

are distinct constructs (with the exception of communication), either existing and/or developing independently of the other. Examined further, as SBA generally emphasises a requirement for clinical knowledge (eg, disease-specific history gathering) and the MMI emphasises non-clinical attributes (eg, self-awareness), large and highly predictive associations may not be feasible. However, both have been identified as meaningful attributes in the health professions. As one does not appear to be a strong predictor of the other, for the larger construct of paramedic practice to be adequately assessed, a programme of assessment combining the results of both should be considered. Applying a multimethod programmatic approach may ultimately optimise predictions of future *paramedic practice*.[23] The paramedic community, including researchers, will need to explore how best to allocate or align efforts and resources to include both for optimal selection strategies. Including one without the other may simply under-represent the construct of paramedic practice.

As this study is the first to explore the assessment of non-clinical attributes in the field of paramedicine using an MMI, future research will need to seek additional validity evidence. One such source may be in asking what consequences use of the MMI has on the profession (ie, consequential validity). This study was largely driven by an identified need to consider non-clinical attributes in paramedic practice, and to do so using an evidence-based process. Whether use of the MMI in paramedic contexts results in any meaningful change in the candidates entering the field (either through admission or entry to practice testing or by directly or indirectly placing emphasis on these attributes) and/or results in meaningful changes in the delivery of service will be an important area to explore. This will need to be supplemented by continued research investigating desirable attributes and refinements to the MMI process (eg, case development and rating tools) to better assess and isolate them.

Limitations

There are several limitations in this study. The tool used to measure performance in this MMI demonstrated high inter-item correlations and did not allow for evaluation of specific attributes (eg, ethical and moral judgement) beyond what could be inferred from inclusion of those attributes in the case development. Further development of tools and scoring strategies might further optimise the MMI. This study included only one interviewer per station and, therefore, we were unable to calculate inter-rater reliability and isolate case and rater effects. Doing so may further inform end users with additional information regarding how best to optimise the assessment. The associations between constructs must be interpreted with context and the population (ie, participants and raters) in mind as both reliability and correlations observed are dependent on both. Therefore, the results may differ in other settings. Finally, while the results we provided are meaningful, this study is limited by the sample size, potential homogeneity of the paramedic trainees and restriction of range observed in the SBA. That said, homogeneity of trainees (given that all participants were selected to and trained in paramedicine), along with the minimal rater training provided in both the MMI and the SBA, should, if anything, yield an underestimate of reliability/correlations. Correlation studies are susceptible to number of pairings (especially in establishing statistical significance) and the presence of outliers. While we searched for and removed any outliers (n=1) future research will need to replicate this study with a larger number of pairings/sample size to test the robustness of our results.

CONCLUSIONS

Non-clinical attributes have been identified as important attributes in paramedic practice but have traditionally been poorly measured. As paramedics become increasingly called upon to practice in non-traditional roles along with the growing emphasis

Table 5 MMI interviewer survey questions and results

Interviewer survey questions regarding MMI		n=10 Mean and SD
1.	Were you able to develop an accurate portrayal of each candidate?	4.2 (0.41)
2.	Did you have enough time (8 min) to interact with the candidate?	4.5 (0.52)
3.	Did you have enough time (2 min) to complete the scoring rubric for each candidate?	3.9 (1.04)
4.	Do you think the MMI can be used to select candidates for admission to paramedic programmes?	4.5 (0.93)
5.	Do you think the MMI can be used to select candidates for employment as a paramedic?	4.5 (0.52)
6.	Do you recommend using the MMI in base hospital certification processes?	3.7 (1.27)
7.	Does the MMI capture non-clinical attributes relevant to professional paramedic practice?	3.6 (0.80)
8.	How well were you able to assess communication skills?	4.5 (0.52)
9.	How well were you able to assess suitability for paramedicine?	3.5 (1.03)

For questions 1–7, five-point scale anchored using 1=definitely not, 2=not really, 3=maybe, 4=yes, for the most part and 5=yes, absolutely. For questions 8 and 9, five-point scale anchored using 1=not at all, 2=not well, 3=moderately well, 4=very well and 5=extremely well.
MMI, multiple mini-interview.

Table 6 MMI participant survey questions and results

	Participant survey regarding MMI	n=10 Mean and SD
1.	Overall, do you believe that you were able to accurately portray your abilities in this MMI?	3.5 (0.69)
2.	Does the MMI capture non-clinical attributes relevant to professional paramedic practice?	3.7 (0.97)
3.	Does the MMI capture non-clinical attributes relevant to clinical paramedic practice?	3.2 (0.83)
4.	Would use of the MMI prevent you from applying to a paramedic programme?	1.6 (0.80)
5.	Would use of the MMI prevent you from applying to an emergency medical service?	1.6 (0.72)
6.	Would use of the MMI prevent you from applying to a base hospital for certification?	1.6 (0.80)
7.	Do you think the responses to the interview questions could be used to assess your suitability for paramedicine?	3.4 (1.16)
8.	Did any of the interviews require specialised knowledge (participants provided a rating for each station).	2.9 (1.00)
9.	Was the timing for each interview (8 min) appropriate?	3.7 (0.83)
10.	How difficult was each station?	2.8 (0.89)

For questions 1–7, five-point scale anchored using 1=definitely not, 2=not really, 3=maybe, 4=yes, for the most part and 5=yes, absolutely. For question 8, five-point scale anchored using 1=none, 2=a little, 3=some, 4=a lot and 5=extensive. For question 9, five-point scale anchored using 1=definitely not, 2=not really, 3=sometimes, 4=yes, for the most part and 5=yes, absolutely. For question 10, 5-point scale anchored using 1=not at all, 2=a little, 3=somewhat, 4=very and 5=extremely.
MMI, multiple mini-interview.

on non-clinical attributes in paramedic practice, the field is in need of assessment strategies that can measure these attributes defensibly. This study contributes to the field of paramedicine by demonstrating that the MMI is a reliable and valid measure for the assessment of non-clinical attributes in paramedic contexts. Second, the results of this study suggest that non-clinical attributes and paramedic clinical skills are likely two distinct but related constructs, each contributing to the construct of paramedic practice. Therefore, adapting the MMI for paramedic contexts can be a reliable and valid strategy to assess non-clinical attributes but should be used as part of a larger programme of assessment aimed as assessing overall paramedic practice.

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