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Evaluating procedural justice in postgraduate medical selection

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Manuscript Type:	Research Papers
Keywords:	Admission/Selection/minority recruitment, Testing/Assessment

1
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3 Abstract

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5 Objective. To examine candidate reactions to selection practices for entry into
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8 postgraduate training using organisational justice theory.
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10 Design. Three independent cross-sectional studies, using samples from three consecutive
11
12 annual recruitment rounds.
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15 Setting. Data was gathered from candidates applying for entry into UK General Practice
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17 (GP) training during 2007, 2008 and 2009. Participants completed an evaluation
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19 questionnaire immediately following the shortlisting stage and after the selection centre
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21 (interview) stage.
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24 Participants. Participants were doctors applying for training in General Practice in the
25
26 UK. A total of 23,855 evaluation questionnaires were completed (6,893 in 2007, 10,497
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28 in 2008 and 6,465 in 2009).
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31 Main outcome measures. Participants' evaluations of the selection methods and overall
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33 fairness perceptions at both selection stages (shortlisting and selection centre).
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36 Results. Absolute levels of fairness perceptions for all the selection methods at both
37
38 shortlisting and selection centre were consistently high over three years. Similarly, all
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40 selection methods were considered job related by candidates. However, in general,
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42 candidates considered the selection centre stage to be significantly more fair than the
43
44 shortlisting stage. Of all the selection methods, the simulated patient consultation
45
46 completed at selection centre was rated as the most job-relevant selection method.
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50 Conclusion. This is the first study to use a model of organisational justice theory to
51
52 evaluate candidate reactions during selection into postgraduate specialty training. The
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54 high fidelity selection methods are consistently viewed as more job relevant and fair by
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3 candidates. This has important implications for the design of recruitment systems for all
4 specialties and potentially, for medical school admissions. Using this approach recruiters
5 can systematically compare perceptions of fairness and job relevance of various selection
6 methods.
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15 Introduction

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17 Selection for entry into postgraduate training is a particularly high stakes process given
18 the years of training a candidate has already undertaken. In the UK, this once-a-year process is
19 the only means of entry to training in their chosen specialty. Whilst it is clearly vital to ensure
20 that the selection methods are valid and reliable, the candidate's perspective¹ and perceptions of
21 fairness must also be considered.^{2,3} This paper describes the use of a measure of candidate
22 reactions to selection practices in order to compare perceptions of various selection methods and
23 approaches.⁴ Organisational justice theory provides a theoretical model^{5,6} for interpreting
24 candidate reactions which focuses on both *procedural* (fairness of the selection procedure itself)
25 and *distributive justice* (fairness of the outcome) which has been used extensively in
26 organisational research.^{4,6,7} The model (in Figure 1) proposes that selection system characteristics
27 are considered fair to the extent that they comply with certain procedural and distributive justice
28 rules.⁴⁻⁶ The present study focuses on procedural justice only, because evaluation questionnaires
29 were completed after testing, but before candidates received the results of the process, and
30 therefore they could not comment on perceptions of distributive justice.
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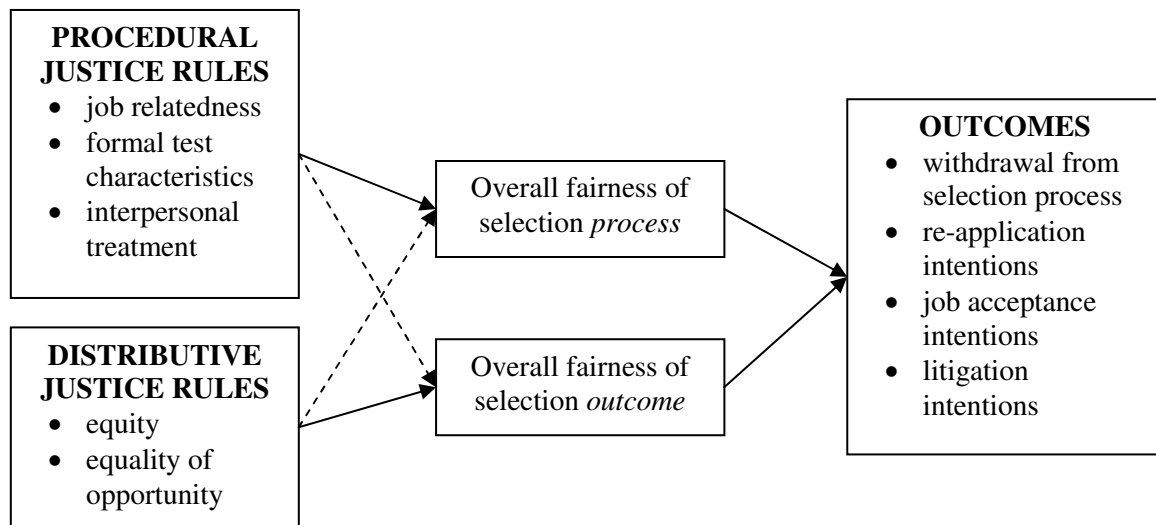


Figure 1: An organisational justice model of applicant's reactions to selection systems

When considering procedural justice, perceptions of the selection process regarding the *formal test characteristics* (the qualities of the selection methods themselves and whether candidates feel they are able to demonstrate their ability) and *interpersonal treatment* (whether candidates feel that they are treated appropriately) are important in influencing fairness perceptions. Justice perceptions in turn can lead to individual and organisational outcomes.⁵⁻⁸

Substantial research literature has explored candidate reactions in selection for many occupational groups outside medicine.^{7,9,10,11} In this study, the principles from the model of organisational justice theory are applied to examine candidate reactions for selection into medicine. Generally, findings suggest that positive candidate reactions to selection methods and processes are important for a number of reasons: i) negative candidate reactions are associated with loss of competent candidates from the selection process⁹; ii) candidates have lower intentions to accept job offers where selection practices are perceived negatively¹⁰; iii) candidates who perceive processes to be unfair may legally challenge an organisation,¹⁰ iv) candidates are less likely to re-apply if they feel mistreated,⁵ and v) candidates who have negative perceptions and are unsuccessful may criticise the process and potentially reduce further applications.¹² Therefore, positive candidate reactions are likely to enhance both the process and the calibre of

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3 those appointed. In the context of medical selection, public perceptions of fairness and credibility
4 are also crucially important.³ Using organisational justice theory, this study aims to evaluate the
5 candidates' perspective of selection for entry into postgraduate training, and to compare reactions
6 to several selection methods.³
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11 **Method**

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14 Data was collected during the recruitment for entry into UK General Practice (GP)
15 training at both shortlisting and selection centre (interview) stages. The predictive validity of the
16 current GP selection methodology has been established¹³ and here, candidate reactions to this
17 selection process are examined. The aim of this study was to evaluate candidate reactions toward
18 methods used at shortlisting and selection centre and to comment on candidates' perceptions of
19 the overall selection process.
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27 **Design and procedure**

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29 Three independent studies were conducted over three consecutive annual recruitment
30 rounds (2007 to 2009). The shortlisting stage of the selection process entails candidates
31 completing two machine-marked shortlisting tests on a single day in February in one of 15
32 locations in the UK. The two shortlisting tests are; (1) a Clinical Problem Solving test (CPS)
33 developed from an existing item bank in which a candidate applies clinical knowledge to solve a
34 problem reflecting a diagnostic process or developing a management strategy for a patient and,
35 (2) a Situation Judgement Test (SJT), focusing on non-cognitive attributes, where applicants are
36 presented with written depictions of professional dilemmas they may encounter at work, and are
37 asked to identify an appropriate response from a list of alternatives. The CPS test has 100 items
38 and the SJT paper has 50 items and each test lasts approximately 90 minutes.¹⁴ Example items
39 are presented in Figure 1.
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53 ***INSERT FIGURE 1 HERE***
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56 Approximately one month later, the selection centre phase entails candidates completing
57 three selection exercises: (1) a simulated patient consultation, where candidates take the role of
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3 doctor and an actor plays a patient in a given scenario; (2) a group exercise, where four
4 candidates are asked to resolve a work-related issue; (3) a written exercise in which candidates
5 are asked to prioritise a set of impending work-related issues, justifying the order chosen. Each
6 exercise is timetabled for 30 minutes.³ Candidates were invited to participate in our study
7 following completion of the shortlisting and selection centre exercises on a voluntary, anonymous
8 basis. We emphasised that all information would be used for research purposes only.
9

16 *Shortlisting stage*

18 In 2007, a pilot evaluation questionnaire was designed for use at the shortlisting stage,
19 which focused on the job relevance of the shortlisting tests. Candidates who attended the
20 shortlisting tests at three locations (xx yy and zz) were invited on a voluntary basis to complete a
21 paper-based evaluation questionnaire immediately after they finished both tests. The data from
22 this pilot was useful in reviewing the item content and the psychometric properties of the
23 evaluation questionnaire before administering to a large number of candidates (in 15 locations in
24 the UK). In 2008, all candidates who attended shortlisting were invited to complete the
25 candidate reaction questionnaire following completion of the tests, either in a paper-based format
26 or online via email (sent within 24 hours of completing the tests). In 2009, all candidates were
27 invited to complete the evaluation questionnaire online after completing the shortlisting tests.
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40 *Selection centre stage*

42 Over the three years, all candidates attending the selection centre stage in 15 UK
43 locations were asked to complete the paper-based candidate reaction questionnaire which was
44 administered by invigilators.
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48 **Item Design**

50 All items were adapted from previous research^{15,16} and responses were rated on a 5-point
51 Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. In designing items for use
52 in this study we focused on the *job relevance* of the selection methods for several reasons. First,
53 empirical findings in other occupational settings suggests that job relevance is the aspect of
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3 candidate reactions that has the greatest influence on fairness.^{6,8,10} Second, in the present context
4 the selection methods were administered to applicants in large group sessions and therefore many
5 of the other justice principles in the organisational justice model⁴ were likely to be restricted in
6 their effects due to lack of variance.¹¹ For instance, because the administration of tests was
7 standardised, the justice principles relating to consistency of administration, selection information
8 and explanation were constant for all applicants in the group session. However, job relevance
9 perceptions vary across candidates even when the same test is used.¹¹ Third, job relevance is one
10 aspect of a high stakes selection process to which candidates are particularly sensitive: the
11 relevance of procedures that are used to make selection decisions.^{11, 14}
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23 To design items to evaluate the shortlisting stage we developed three items measuring job
24 relevance perceptions of the Clinical Problem-Solving (CPS) test and three items measuring job
25 relevance of the Situation Judgment Test (SJT), e.g. *“The content of the Clinical Problem-Solving*
26 *test was relevant to the role of general practitioner”*. To evaluate the selection centre, three
27 items were designed to measure the job relevance of each of the group exercise; the simulated
28 patient consultation, and the written exercise; e.g. *“The content of the simulated patient*
29 *consultation was clearly related to the role of general practitioner”*.
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38 In addition, two further aspects of candidate reactions at both the shortlisting and
39 selection centre stages were evaluated relating to the formal test characteristics (3 items, e.g. *“A*
40 *person who scored well on the assessment will be good at general practice”*) and interpersonal
41 treatment (3 items, e.g. *“The staff treated candidates with respect during the assessment”*).
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47 **Data analysis**

48 Descriptive statistics were analysed for all scales in the study including Cronbach alpha
49 reliabilities. Wilcoxon signed ranks tests were used to examine differences in perceptions for the
50 shortlisting and selection centres stages and between the different selection methods. Non-
51 parametric tests were used due to negatively skewed data.
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57 **Results**

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3 Table 1 outlines the demographics (age, gender, ethnicity) for the three independent
4 summarises the results relating to all sampling size across the three years, including both
5 shortlisting and selection centre stages.
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10 ***INSERT TABLE 1 HERE***
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12 During shortlisting in 2007, a pilot sample of 307 candidates completed the evaluation
13 questionnaire (190 in xx, 93 in yy and 24 in zz); representing a 53% response rate. Having
14 established the item content, in 2008, 5,866 participants completed the questionnaire (72%
15 response rate). Questionnaires were administered in either paper-based format distributed by
16 invigilators at the shortlisting test centre (N=4,742) or online via email administered on the same
17 day as testing (N=1,124). Results indicated no differences in pattern of responses between paper-
18 based and online administration. In 2009 a total of 2,894 candidates completed an evaluation
19 questionnaire online, representing a 51% response rate. The 2009 response rate is lower than in
20 2008; possibly due to data collection being online rather than candidates completing a paper-
21 based questionnaire immediately after the assessment as in previous years.
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33 For the selection centre stage, in 2007, 6,586 candidates completed the questionnaire
34 (93% response rate); in 2008, 4,631 candidates completed the questionnaire (83.5% response
35 rate), and in 2009, 3,571 candidates completed the questionnaire (79% response rate).
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40 *Candidate reactions overall*

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42 Results presented in Table 2 show good Cronbach's alpha reliabilities for all scales (α
43 ranging from .70 to .94). Findings show that in general, candidates have positive reactions during
44 both shortlisting and selection centre phases: all selection methods are considered job relevant
45 and both phases are considered fair in relation to both their formal test characteristics and
46 interpersonal treatment. This is indicated by the mode and mean values that are well above the
47 mid-point for the scale ranges. In general, perceptions of fairness are significantly more positive
48 during the selection centre stage, than during shortlisting.
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Candidate reactions towards the shortlisting tests

Overall, the Clinical Problem Solving (CPS) test the job relevance was rated as consistently high over three consecutive years. The Situational Judgement Test (SJT) is perceived to be significantly more job related in 2009 than it was in 2007 ($U = 11163.50, p < .001$), with significant improvements in candidate reactions over this time. In comparing the shortlisting tests, in each year, the CPS is considered significantly more job relevant than the SJT (all $p < .001$). Perceptions of formal test characteristics and interpersonal treatment were not measured in 2007; however perceptions of both formal test characteristics ($U = 41689.50, p < .001$) and interpersonal treatment ($U = 40634.50, p < .001$) were significantly more positive in 2009 than they were in 2008.

Candidate reactions towards the selection centre

For the group exercise and the written exercise, candidate perceptions of job relevance were significantly more positive in both 2008 and 2009 than they were in 2007, but there were no significant differences between 2008 and 2009. The group exercise is perceived to be significantly more job relevant in the years 2008 ($U = 99608.50, p < .001$) and 2009 ($U = 53709.50, p < .001$) than it was in 2007. The written exercise is perceived as significantly more job relevant in 2008 ($U = 133156.00, p < .001$) and 2009 ($U = 76950.50, p < .001$) than it was in 2007. However, there is no significant difference in perceptions of job relevance for the simulated patient consultation exercise over the three years, and candidate reactions were consistently more positive towards this selection method than any other. In each year, the simulated patient consultation exercise is considered the most job relevant selection method by candidates (all $p < .001$) compared to the group exercise and written exercise. Finally, there were no significant differences in candidate perceptions of the formal test characteristics and interpersonal treatment over the three years for the selection centre.

Discussion

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3 To the authors' knowledge, this is the first study to examine candidate reactions towards
4 selection methods used for recruitment into postgraduate medical training using a model of
5 organisational justice theory. Specifically, the *job relevance* of the selection methods (used at
6 both shortlisting and selection centre stages), is examined, and the overall *procedural justice*
7 perceptions of the selection process (relating to both the formal test characteristics and
8 interpersonal treatment). Organisational theory justice has been used previously in studies where
9 candidate reactions and fairness perceptions are shown to be critical to the success of an
10 organisation's selection processes.^{8,10} Overall, results show the selection process evaluated here
11 (UK General Practice) to be received positively as indicated by the fact that all selection methods
12 were judged to be job relevant and all selection methods were considered fair in relation to both
13 the methods themselves, and the way in which candidates reported they were treated. Results
14 show that the selection centre overall was rated as significantly more fair than the shortlisting
15 stage, supporting previous empirical research in other occupational settings.¹⁰ Research suggests
16 that selection methods that are higher fidelity (e.g. simulations) are rated significantly more
17 positively by candidates than lower fidelity methods (e.g. machine marked tests). Results suggest
18 that candidate perceptions indicate the relative face validity and fairness of a selection method.
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38 At shortlisting stage, findings indicate that candidate reactions to the SJT were less
39 positive than the CPS, although over time, perceptions of job relevance of the SJT has improved
40 significantly over the three years. In this context, there were interventions to increase information
41 before, during and after selection regarding the SJT methodology, which suggest these
42 interventions have been successful. Changes in candidate perceptions (indicating face validity) is
43 important because the SJT method has been shown to be one of the best predictors of future job
44 performance in this setting (i.e. predictive validity).³ This suggests that candidates prefer
45 selection methods that require answers based on clear facts, such as in the CPS, compared to the
46 SJT, focusing on judgement of professional dilemmas where the 'correct' response is potentially
47 more complex. Similarly, job relevance perceptions of the group and written exercises at the
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3 selection centre stage have become more positive over the three years; whilst overall, the
4 simulated patient consultation is rated as the most job-relevant selection method. This concurs
5 with previous studies outside of medicine, where work samples are among the most positively
6 perceived selection methods by candidates.^{17,18} These findings have important implications for
7 selection processes in medicine. High fidelity assessments, such as the simulated patient
8 consultation, are considered face valid because they closely resemble work conditions¹⁸ and
9 therefore are positively received by candidates; however they are also costly to design and
10 implement. In the case of GP selection, the low fidelity shortlisting stage using machine-marked
11 tests costs approximately £75 per candidate and the high fidelity selection centre costs
12 approximately £400 per candidate. Further, although the predictive validity of the SJT is high,
13 such lower fidelity assessments are less positively received by candidates because they are
14 perceived to have lower face validity.³ It is important therefore for employers to examine
15 candidate reactions to selection methods, because if negative reactions cause competent
16 candidates to withdraw from selection⁹, this may also have an undesirable consequence of
17 reducing the utility of the process.²⁰

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36 From a recruiter's perspective, perceptions of fairness towards selection methods
37 significantly reduces the likelihood of candidate litigation.⁸ The model presented here can be used
38 to monitor ongoing perceptions of selection processes and to assess relative levels of fairness for
39 different methods - which might provide useful information when designing and choosing
40 methods of selection. The evaluation questionnaires used in this study can be used to research
41 candidate reactions over several recruitment rounds and when new selection methods are
42 introduced (such as the SJT in this setting), changes in candidate reactions can be monitored. This
43 has important implications for the design of recruitment systems for all medical specialties and
44 potentially, for medical school admissions. The measures reported here can help recruiters
45 reliably monitor and compare perceptions of fairness and relevance of various selection methods
46 from the candidate perspective. Future research could also evaluate the layperson or public
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perceptions of how doctors are selected and compare this to the doctor perspective, using a justice approach described in this study,

For Review

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For Review

Figure 1: Example Items for the Clinical Problem-Solving and Situational Judgement Shortlisting Tests

SJT Item

You are reviewing a routine drug chart for a patient with rheumatoid arthritis during an overnight shift. You notice that your consultant has inappropriately prescribed methotrexate 7.5mg daily instead of weekly.

Rank in order the following immediate actions in response to this situation (1= Most appropriate; 5= Least appropriate).

- A. *Ask the nurses if the consultant has made any other drug errors recently.*
- B. *Correct the prescription to 7.5mg weekly.*
- C. *Leave the prescription unchanged until the consultant ward round the following morning.*
- D. *Phone the consultant at home to ask about changing the prescription.*
- E. *Inform the patient of the error.*

CPS Item

Reduced Vision

- | | |
|--|--|
| A. <i>Basilar migraine</i> | F. <i>Central retinal vein occlusion</i> |
| B. <i>Cerebral tumour</i> | G. <i>Optic neuritis (demyelinating)</i> |
| C. <i>Cranial arteritis</i> | H. <i>Retinal detachment</i> |
| D. <i>Macular degeneration</i> | I. <i>Tobacco optic neuropathy</i> |
| E. <i>Central retinal artery occlusion</i> | |

For each patient below select the **SINGLE** most likely diagnosis from the list above. Each option may be selected once, more than once or not at all.

1. A 75 year old man, who is a heavy smoker, with a blood pressure of 170/105, complains of floaters in the left eye for many months and flashing lights in bright sunlight. He has now noticed a "curtain" across his vision.
2. A 70 year old woman complains of shadows that sometimes obscure her vision for a few minutes. She has felt unwell recently with loss of weight and face pain when chewing food.

Table 1: Sample details and breakdown

	N	Mean age	Women	Men	White	Asian	Black	Mixed	Chinese	Other
<i>2007 samples</i>										
Shortlisting (pilot)	307	31	62%	38%	55%	27%	8%	1%	2%	6%
Selection centre	6586	30	56%	44%	44%	42%	5%	2%	2%	5%
<i>2008 samples</i>										
Shortlisting	5866	30	45%	47%	33%	45%	7%	2%	2%	5%
Selection centre	4631	29	50%	46%	40%	42%	4%	2%	2%	5%
<i>2009 samples</i>										
Shortlisting	2894	32	57%	42%	47%	36%	8%	2%	2%	4%
Selection centre	3571	30	53%	38%	45%	38%	5%	2%	2%	4%

Note. Percentages do not add up to 100 due to missing data.

Table 2: Means, standard deviations and alpha reliabilities of the scales for three consecutive years

	2007 samples				2008 samples				2009 samples			
	Mode	Mean	S.D.	α	Mode	Mean	S.D.	α	Mode	Mean	S.D.	α
Shortlisting	<i>N = 307 (pilot sample)</i>				<i>N = 5866</i>				<i>N = 2894</i>			
CPS test job relevance (3 items)	12.0	11.31	2.66	.85	12.0	11.41	2.53	.84	12.0	12.05	2.02	.84
SJT job relevance (3 items)	12.0	8.06	3.27	.89	12.0	9.77	2.82	.87	12.0	9.94	2.60	.84
Overall fairness: Formal test characteristics (3 items)*	-	-	-	-	11.0	10.60	2.38	.70	12.0	11.33	2.01	.73
Overall fairness: Interpersonal treatment (3 items)*	-	-	-	-	12.0	12.05	2.84	.91	12.0	12.61	2.34	.91
Selection Centre	<i>N = 6586</i>				<i>N = 4631</i>				<i>N = 3571</i>			
Group exercise job relevance (3 items)	12.0	10.21	2.53	.82	12.0	11.38	2.10	.78	12.0	11.29	1.85	.82
Simulated patient consultation job relevance (3 items)	12.0	11.93	2.24	.83	12.0	12.49	2.07	.83	12.0	12.15	2.06	.78
Written exercise job relevance (3 items)	9.0	9.63	2.66	.87	12.0	11.03	2.16	.81	12.0	10.98	1.98	.84
Overall fairness: FTC (3 items)	12.0	12.52	2.12	.83	12.0	12.74	1.98	.78	12.0	12.34	1.69	.70
Overall fairness: IT (3 items)	15.0	13.59	1.84	.91	15.0	13.73	1.91	.93	15.0	13.53	1.75	.94

Note: CPS = Clinical problem-solving; SJT = Situational Judgement Test; SPC = Simulated Patient Consultation; GE = Group Exercise; WE = Written Exercise; FTC = Formal Test Characteristics; IT = Interpersonal Treatment. * Formal test characteristics and Interpersonal treatment data were not collected in 2007 as this was a pilot.

Evaluating procedural justice in postgraduate medical selection

Introduction

Selection for entry into postgraduate training is a particularly high stakes process given the years of training a candidate has already undertaken. In the UK, this once-a-year process is the only means of entry to training in their chosen specialty. Whilst it is clearly vital to ensure that the selection methods are valid and reliable, the candidate's perspective¹ and perceptions of fairness must also be considered.^{2,3} This paper describes the use of a measure of candidate reactions to selection practices in order to compare perceptions of various selection methods and approaches.⁴ Organisational justice theory provides a theoretical model^{5,6} for interpreting candidate reactions which focuses on both *procedural* (fairness of the selection procedure itself) and *distributive justice* (fairness of the outcome) which has been used extensively in organisational research.^{4,6,7} The model (in Figure 1) proposes that selection system characteristics are considered fair to the extent that they comply with certain procedural and distributive justice rules.⁴⁻⁶ The present study focuses on procedural justice only, because evaluation questionnaires were completed after testing, but before candidates received the results of the process, and therefore they could not comment on perceptions of distributive justice.

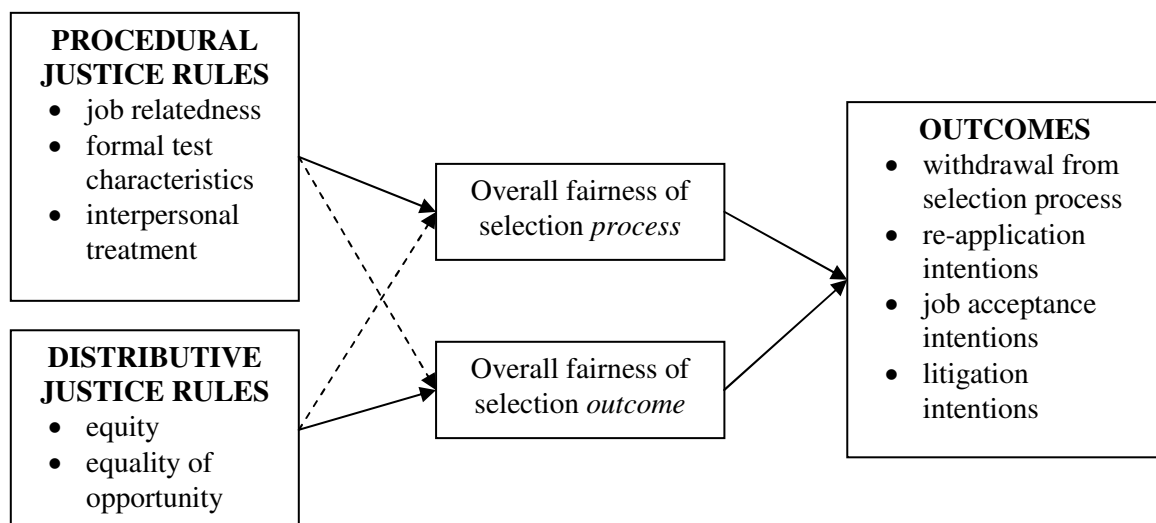


Figure 1: An organisational justice model of applicant's reactions to selection systems

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When considering procedural justice, perceptions of the selection process regarding the *formal test characteristics* (the qualities of the selection methods themselves and whether candidates feel they are able to demonstrate their ability) and *interpersonal treatment* (whether candidates feel that they are treated appropriately) are important in influencing fairness perceptions. Justice perceptions in turn can lead to individual and organisational outcomes.⁵⁻⁸

Substantial research literature has explored candidate reactions in selection for many occupational groups outside medicine.^{7,9,10,11} In this study, the principles from the model of organisational justice theory are applied to examine candidate reactions for selection into medicine. Generally, findings suggest that positive candidate reactions to selection methods and processes are important for a number of reasons: i) negative candidate reactions are associated with loss of competent candidates from the selection process⁹; ii) candidates have lower intentions to accept job offers where selection practices are perceived negatively¹⁰; iii) candidates who perceive processes to be unfair may legally challenge an organisation,¹⁰ iv) candidates are less likely to re-apply if they feel mistreated,⁵ and v) candidates who have negative perceptions and are unsuccessful may criticise the process and potentially reduce further applications.¹² Therefore, positive candidate reactions are likely to enhance both the process and the calibre of those appointed. In the context of medical selection, public perceptions of fairness and credibility are also crucially important.³ Using organisational justice theory, this study aims to evaluate the candidates' perspective of selection for entry into postgraduate training, and to compare reactions to several different selection methods.³

Method

Data was collected during the recruitment for entry into UK General Practice (GP) training at both shortlisting and selection centre (interview) stages. The predictive validity of the GP selection methodology has been established¹³ and here, candidate reactions to this selection process are examined. The aim of this study was to evaluate candidate reactions toward methods

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2
3 used at shortlisting and selection centre and to comment on candidates' perceptions of the overall
4
5 selection process.
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7 8 **Design and procedure**

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10 Three independent studies were conducted over three consecutive annual recruitment
11 rounds (2007 to 2009). The shortlisting stage of the selection process entails candidates
12 completing two machine-marked shortlisting tests on a single day in Spring in one of 15 locations
13 in the UK. The two shortlisting tests are; (1) a Clinical Problem Solving test (CPS) in which a
14 candidate applies clinical knowledge to solve a problem reflecting a diagnostic process or
15 develop a management strategy for a patient and, (2) a Situational Judgement Test (SJT),
16 focusing on non-cognitive attributes, where applicants are presented with written depictions of
17 professional dilemmas they may encounter at work, and are asked to choose appropriate
18 responses from a list of alternatives. The CPS test has around 100 items and the SJT paper has 50
19 items and each test lasts approximately 90 minutes.¹⁴ Example items are presented in Figure 1.
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32 ***INSERT FIGURE 1 HERE***

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34 Approximately one month later, the selection centre phase entails candidates completing
35 three selection exercises: (1) a simulated patient consultation, where candidates take the role of
36 doctor and a role-player plays a patient in a given scenario; (2) a group exercise, where four
37 candidates are asked to resolve a work-related issue; (3) a written exercise in which candidates
38 are asked to prioritise a set of work-related issues, justifying the order chosen. Each exercise is
39 timetabled for 30 minutes.³ Candidates were invited to participate in our study following
40 completion of the shortlisting and selection centre exercises on a voluntary, anonymous basis.
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49 We emphasised that all information would be used for research purposes only.

50 51 *Shortlisting stage*

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53 In 2007, a pilot evaluation questionnaire was designed for use at the shortlisting stage,
54 which focused on the job relevance of the shortlisting tests. Candidates who attended the
55 shortlisting tests at three locations (Oxford, Wessex and West Midlands) were invited on a
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voluntary basis to complete a paper-based evaluation questionnaire immediately after they finished both tests. The data from this pilot was useful in reviewing the item content and the psychometric properties of the evaluation questionnaire before administering to a large number of candidates (in 15 locations in the UK). In 2008, all candidates who attended shortlisting were invited to complete the candidate reaction questionnaire following completion of the tests, either in a paper-based format or online via email (sent within 24 hours of completing the tests). In 2009, all candidates were invited to complete the evaluation questionnaire online after completing the shortlisting tests.

Selection centre stage

Over the three years, all candidates attending the selection centre stage in 15 UK locations were asked to complete the paper-based candidate reaction questionnaire which was administered by invigilators.

Item Design

All items were adapted from previous research^{15,16} and responses were rated on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. In designing items for use in this study we focused on the *job relevance* of the selection methods for several reasons. First, empirical findings in other occupational settings suggests that job relevance is the aspect of candidate reactions that has the greatest influence on fairness.^{6,8,10} Second, in the present context the selection methods were administered to applicants in large group sessions and therefore many of the other justice principles in the organisational justice model⁴ were likely to be restricted in their effects due to lack of variance.¹¹ For instance, because the administration of tests was standardised, the justice principles relating to consistency of administration, selection information and explanation were constant for all applicants in the group. However, job relevance perceptions vary across candidates even when the same test is used.¹¹ Third, job relevance is one aspect of a high stakes selection process to which candidates are particularly sensitive: the relevance of procedures that are used to make selection decisions.^{11, 14}

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3 To design items to evaluate the shortlisting stage we developed three items measuring job
4 relevance perceptions of the Clinical Problem-Solving (CPS) test and three items measuring job
5 relevance of the Situational Judgement Test (SJT), e.g. *“The content of the Clinical Problem-
6 Solving test was relevant to the role of general practitioner”*. To evaluate the selection centre,
7 three items were designed to measure the job relevance of each of the group exercise; the
8 simulated patient consultation, and the written exercise; e.g. *“The content of the simulated patient
9 consultation seemed appropriate for the entry level I am applying for”*.

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11
12 In addition, two further aspects of candidate reactions at both the shortlisting and
13 selection centre stages were evaluated relating to the formal test characteristics (3 items, e.g. *“A
14 person who scored well on the assessment will be good at general practice”* and *“The content of
15 the selection centre appeared to be fair to all candidates”*) and interpersonal treatment (3 items,
16 e.g. *“The staff treated candidates with respect during the assessment”* and *“I was satisfied with
17 my treatment at the selection centre”*).

31 Data analysis

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33 Cases with missing data were dealt with by conducting a mean substitution; this was
34 deemed acceptable since none of the datasets had more than 0.4% missing cases. Descriptive
35 statistics were analysed for all scales in the study including Cronbach alpha reliabilities. Scale
36 totals were calculated by summing each of the three scale items to create a score out of 15.
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38 Wilcoxon signed ranks tests were used to examine differences in perceptions for the shortlisting
39 and selection centres stages and between the different selection methods. Non-parametric tests
40 were used due to negatively skewed data.
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48 Results

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50 Table 1 outlines the demographics (age, gender, ethnicity) for the three independent
51 samples and summarises the results relating to all sampling across the three years, including both
52 shortlisting and selection centre stages.
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During shortlisting in 2007, a pilot sample of 307 candidates completed the evaluation questionnaire (190 in Oxford, 93 in Wessex and 24 in West Midlands); representing a 53% response rate. Having established the item content, in 2008, 5,866 participants completed the questionnaire (72% response rate). Questionnaires were administered in either paper-based format distributed by invigilators at the shortlisting test centre (N=4,742) or online via email administered shortly after the assessment (N=1,124). Results indicated no differences in pattern of responses between paper-based and online administration. In 2009 a total of 2,894 candidates completed an evaluation questionnaire online, representing a 51% response rate. The 2009 response rate is lower than in 2008; possibly due to data collection being fully online rather than most candidates completing a paper-based questionnaire immediately after the assessment as in previous years.

For the selection centre stage, in 2007, 6,586 candidates completed the questionnaire (93% response rate); in 2008, 4,631 candidates completed the questionnaire (83.5% response rate), and in 2009, 3,571 candidates completed the questionnaire (79% response rate).

Candidate reactions overall

Results are presented in Table 2, all scales show good Cronbach's alpha reliabilities for all scales (α ranging from .70 to .94). Findings show that in general, candidates have positive reactions during both shortlisting and selection centre phases: all selection methods are considered job relevant and both phases are considered fair in relation to both their formal test characteristics and interpersonal treatment. This is indicated by the mode and mean values that are well above the mid-point for the scale ranges. In general, perceptions of fairness are significantly more positive during the selection centre stage, than during shortlisting.

INSERT TABLE 2 HERE

Candidate reactions during shortlisting

Perceptions of relevance of the shortlisting tests

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3 Overall, the Clinical Problem Solving (CPS) test job relevance was rated as consistently
4 high over three consecutive years (with no significant change over time). The Situational
5 Judgement Test (SJT) is perceived to be significantly more job related in 2009 than it was in 2007
6 ($U = 11163.50, p < .001$), with significant improvements in candidate reactions over this time.
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11 In comparing the shortlisting tests in each year, the CPS is considered significantly more
12 job relevant than the SJT (all $p < .001$). Note, however, that caution should be taken in
13 comparing the pilot data with subsequent years, since pilot data entails only a small proportion
14 (circa 10%) of the overall number of candidates during that year and may not be truly
15 representative of the candidate population as a whole.
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22 *Overall fairness perceptions of shortlisting*

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24 Perceptions of formal test characteristics and interpersonal treatment were not measured
25 in 2007; however perceptions of both formal test characteristics ($U = 41689.50, p < .001$) and
26 interpersonal treatment ($U = 40634.50, p < .001$) were significantly more positive in 2009 than
27 they were in 2008.
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33 **Candidate reactions during selection centres**

34 *Perceptions of relevance of the selection centre exercises*

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36 For the group exercise and the written exercise, candidate perceptions of job relevance
37 were significantly more positive in both 2008 and 2009 than they were in 2007, but there were no
38 significant differences between 2008 and 2009. The group exercise is perceived to be
39 significantly more job relevant in the years 2008 ($U = 99608.50, p < .001$) and 2009 ($U =$
40 $53709.50, p < .001$) than it was in 2007. The written exercise is perceived as significantly more
41 job relevant in 2008 ($U = 133156.00, p < .001$) and 2009 ($U = 76950.50, p < .001$) than it was in
42 2007. However, there is no significant difference in perceptions of job relevance for the
43 simulated patient consultation exercise over the three years, and candidate reactions were
44 consistently more positive towards this selection method than any other ($p < .001$).
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3 In comparing the selection methods, for each year the simulated patient consultation
4 exercise is considered the most job relevant selection method by candidates (all $p < .001$)
5 compared to the group exercise and written exercises.
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9 10 *Overall fairness perceptions of selection centres*

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12 There were no significant differences in candidate perceptions of the formal test
13 characteristics and interpersonal treatment over the three years for the selection centre.
14

15 16 **Discussion**

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18 To the authors' knowledge, this is the first study to examine candidate reactions towards
19 selection methods used for recruitment into postgraduate medical training using a model of
20 organisational justice theory. Organisational justice theory has been used previously in studies
21 where candidate reactions and fairness perceptions are shown to be critical to the success of an
22 organisation's selection processes.^{8,10} Specifically, in the present study the *job relevance* of the
23 selection methods (used at both shortlisting and selection centre stages), is examined, and the
24 overall *procedural justice fairness* perceptions of the selection process (relating to both the
25 formal test characteristics and interpersonal treatment). Overall, results show the selection
26 process evaluated here (UK General Practice) is received positively as indicated by the fact that
27 all selection methods were judged to be job relevant and both stages of the selection process were
28 considered fair in relation to both the formal test characteristics, and the way in which candidates
29 reported they were treated. Results show that the selection centre overall was rated as
30 significantly more fair than the shortlisting stage ($p < .001$), with the simulated patient consultation
31 being perceived to be the most job related. Our findings support previous empirical research in
32 other occupational settings^{10,17,18}, which suggests that higher fidelity selection methods (e.g.
33 simulations) are rated significantly more positively by candidates than lower fidelity methods
34 (e.g. machine marked tests).
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55 **Implications**

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3 Study findings have several important practical and theoretical implications. The first
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implication relates to the fact that at shortlisting, initial candidate reactions to the SJT were less positive than the CPS. This suggests that candidates prefer selection methods that they perceive as requiring answers based on clear facts, such as in the CPS; compared to the SJT, which focuses on judgements of professional dilemmas where the ‘correct’ response is potentially more complex. This may pose particular issues within postgraduate medical selection, since selection methods that measure non-cognitive domains^a (professional attributes such as empathy and integrity) are crucially important criteria in selection.^{3,14} From an employer’s perspective, it could be argued that selection methods focusing on professional attributes are more important than selection methods focusing on recall of facts, as in the CPS knowledge assessment. In this way, our findings may pose what has been termed a “*justice dilemma*”¹⁹ because the method with the highest criterion-related validity, the SJT³, has comparatively lower face validity from the candidate’s perspective.

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In this present research context, the results from the candidate-based evaluation questionnaires alerted recruiters to this potential dilemma. Subsequently, specific communication interventions were introduced aiming to substantially increase information provided to candidates before, during and after selection regarding the SJT methodology. Information provided included reasons for use of an SJT and relevance in the context of the general practitioner role (i.e. assessing professional attributes beyond clinical knowledge). Findings from previous research²⁰ and this present study suggest that these communication interventions have been successful, with significant year on year improvement in perceptions of the SJT and overall fairness in relation to the shortlisting process as a whole. Similarly, job relevance perceptions of the group and written exercises used in the selection centres have become more positive; this is again due to efforts to increase candidate understanding of why these selection methods are important in this context.

^a The term “*non-cognitive*” is used here to reflect professional attributes required in the job role.

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3 A second implication relates to the high fidelity simulated patient consultation which was
4 the selection method most positively received by candidates, compared to all other selection
5 methods. In the case of GP selection, the (low fidelity) shortlisting stage using machine-marked
6 tests costs approximately £60 per candidate and the (high fidelity) selection centre costs
7 approximately £400 per candidate. It is important therefore for employers to conduct validation
8 studies from both the organisation and candidate perspective. Criterion-related validity studies
9 are necessary to ensure that high-cost selection methods are predictive of future performance (and
10 they have been shown to be in GP selection); conversely, it is important to ensure that low-cost
11 selection methods with high criterion-related validities do not have unintentionally negative
12 effects on candidates. In selection contexts other than medicine, negative reactions may cause
13 competent candidates to withdraw from selection²¹ which has an undesirable consequence of
14 reducing the utility of the process.²² Even if withdrawal does not occur, negative reactions may
15 nevertheless result in candidates having lower intentions to accept job offers¹⁰, lower intentions to
16 re-apply in subsequent years⁵ or an increased propensity to initiate legal proceedings.¹⁰ Therefore,
17 whilst we acknowledge that evaluation from a psychometric perspective (for example predictive
18 validity) may be considered more important by an employer over candidate perceptions regarding
19 the process, we suggest that both perspectives are important considerations in the success of a
20 selection system. Wider stakeholder acceptance is also important (beyond candidate and
21 employer) to ensure the validity and credibility of a selection system, especially for occupations
22 such as medicine.
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46 A third implication is that evaluation questionnaires based on organisational justice
47 theory can be used to monitor perceptions of selection systems over time, to assess relative levels
48 of fairness for different selection methods. This may provide useful information: (1) when
49 designing, and updating methods of selection; (2) to examine candidate reactions over several
50 recruitment rounds when new selection methods are introduced (such as the SJT in this setting),
51 thus alerting recruiters to potential shifts in candidate perceptions. This has important
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3 implications for the design of recruitment systems for all medical specialties and potentially, for
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5 medical school admissions.
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7 **Future directions for research and practice**

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10 Our findings imply that the candidate's perspective is important, at least to the extent that
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12 candidates are able to have confidence in the process, which is thought to be particularly
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14 important in high-stakes selection processes such as those found in postgraduate medicine.²³
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16 Future research and practice should endeavour to capture the candidate's perspective of selection
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18 (to also include perceptions of distributive justice), using both quantitative measures such as that
19
20 reported in the present study, and also qualitative methods to explore the causes for the opinions
21
22 expressed by candidates. Additionally, future research should evaluate and compare the layperson
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24 or public perceptions of how doctors are selected (exploring views regarding both the selection
25
26 criteria chosen and selection methods used), using a justice approach described in this study. In
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28 postgraduate medical selection, we propose that analysing the layperson perspective may extend
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30 further the "*justice dilemma*" in this context.
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Figure 1: Example Items for the Clinical Problem-Solving and Situational Judgement Shortlisting Tests

SJT Item

You are reviewing a routine drug chart for a patient with rheumatoid arthritis during an overnight shift. You notice that your consultant has inappropriately prescribed methotrexate 7.5mg daily instead of weekly.

Rank in order the following immediate actions in response to this situation (1= Most appropriate; 5= Least appropriate).

- A. *Ask the nurses if the consultant has made any other drug errors recently.*
- B. *Correct the prescription to 7.5mg weekly.*
- C. *Leave the prescription unchanged until the consultant ward round the following morning.*
- D. *Phone the consultant at home to ask about changing the prescription.*
- E. *Inform the patient of the error.*

CPS Item

Reduced Vision

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| A. <i>Basilar migraine</i> | F. <i>Central retinal vein occlusion</i> |
| B. <i>Cerebral tumour</i> | G. <i>Optic neuritis (demyelinating)</i> |
| C. <i>Cranial arteritis</i> | H. <i>Retinal detachment</i> |
| D. <i>Macular degeneration</i> | I. <i>Tobacco optic neuropathy</i> |
| E. <i>Central retinal artery occlusion</i> | |

For each patient below select the **SINGLE** most likely diagnosis from the list above. Each option may be selected once, more than once or not at all.

1. A 75 year old man, who is a heavy smoker, with a blood pressure of 170/105, complains of floaters in the left eye for many months and flashing lights in bright sunlight. He has now noticed a "curtain" across his vision.
2. A 70 year old woman complains of shadows that sometimes obscure her vision for a few minutes. She has felt unwell recently with loss of weight and face pain when chewing food.

Table 1: Sample details and breakdown

	N	Mean age	Women	Men	White	Asian	Black	Mixed	Chinese	Other
<i>2007 samples</i>										
Shortlisting (pilot)	307	31	62%	38%	55%	27%	8%	1%	2%	6%
Selection centre	6586	30	56%	44%	44%	42%	5%	2%	2%	5%
<i>2008 samples</i>										
Shortlisting	5866	30	45%	47%	33%	45%	7%	2%	2%	5%
Selection centre	4631	29	50%	46%	40%	42%	4%	2%	2%	5%
<i>2009 samples</i>										
Shortlisting	2894	32	57%	42%	47%	36%	8%	2%	2%	4%
Selection centre	3571	30	53%	38%	45%	38%	5%	2%	2%	4%

Note. Percentages do not add up to 100 due to missing data.

Table 2: Means, standard deviations and alpha reliabilities of the scales for three consecutive years

	2007 samples				2008 samples				2009 samples			
	Mode	Mean	S.D.	α	Mode	Mean	S.D.	α	Mode	Mean	S.D.	α
Shortlisting	<i>N = 307 (pilot sample)</i>				<i>N = 5866</i>				<i>N = 2894</i>			
CPS test job relevance (3 items)	12.0	11.31	2.66	.85	12.0	11.41	2.53	.84	12.0	12.05	2.02	.84
SJT job relevance (3 items)	12.0	8.06	3.27	.89	12.0	9.77	2.82	.87	12.0	9.94	2.60	.84
Overall fairness: Formal test characteristics (3 items)*	-	-	-	-	11.0	10.60	2.38	.70	12.0	11.33	2.01	.73
Overall fairness: Interpersonal treatment (3 items)*	-	-	-	-	12.0	12.05	2.84	.91	12.0	12.61	2.34	.91
Selection Centre	<i>N = 6586</i>				<i>N = 4631</i>				<i>N = 3571</i>			
Group exercise job relevance (3 items)	12.0	10.21	2.53	.82	12.0	11.38	2.10	.78	12.0	11.29	1.85	.82
Simulated patient consultation job relevance (3 items)	12.0	11.93	2.24	.83	12.0	12.49	2.07	.83	12.0	12.15	2.06	.78
Written exercise job relevance (3 items)	9.0	9.63	2.66	.87	12.0	11.03	2.16	.81	12.0	10.98	1.98	.84
Overall fairness: FTC (3 items)	12.0	12.52	2.12	.83	12.0	12.74	1.98	.78	12.0	12.34	1.69	.70
Overall fairness: IT (3 items)	15.0	13.59	1.84	.91	15.0	13.73	1.91	.93	15.0	13.53	1.75	.94

Note: Scale totals are calculated by summing the three items for each scale to create a score out of 15. CPS = Clinical problem-solving; SJT = Situational Judgement Test; SPC = Simulated Patient Consultation; GE = Group Exercise; WE = Written Exercise; FTC = Formal Test Characteristics; IT = Interpersonal Treatment. * Formal test characteristics and Interpersonal treatment data were not collected in 2007 as this was a pilot.