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# 'Exam preparedness': Exploring non-academic predictors of postgraduate exam success

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## Abstract

**Introduction:** There are certain factors in exam preparedness that are not well studied in the postgraduate medical education context. Non-academic predictors have been extensively researched but usually in isolation.

**Methods:** The study involved a sequential explanatory mixed methods research design. The study was conducted among anaesthesia postgraduates appearing for high-stake nation-wide primary examination. Data obtained by a questionnaire assessing pre-examination attributes were compared with the students' reflections through focus group discussions (FGD) after the formal declaration of results. The examination had an overall pass rate of 42.9% (18 out of 42).

**Results:** The study showed that pre-examination questionnaire could identify attributes and study behaviours in the postgraduates who passed. Passers procrastinated three times lesser, pursuing a timetable-based study (conscientiousness); had higher metacognitive self-regulation ( $p$  value < 0.05) applying concentrated self-directed learning & effective group study and higher self-efficacy compared to those who failed. The focus group discussions affirmed of these attributes in candidates who 'breeze through exams'. Postgraduate success required better 'work-study' balance, self & cross regulation and peer and faculty support.

**Conclusion:** Implementing a composite tool to assess 'exam preparedness', we propose, would help the learners and teachers to skim for non-academic factors (metacognitive self-regulation, self-efficacy, conscientiousness) that influence the chances of success. Understanding & predicting this would help educators to identify the 'candidates with difficulty' and delegate personalised faculty attention. This could guide the exam candidates to have a 'reality check' to plan and pace their effort with peer learning, consolidated study and goal orientation.

**Keywords:** Postgraduate Exam Success, Non-Academic Predictors, Self-Regulation

## Practice Highlights

- Non-academic attributes impact success in postgraduate examinations.
- Postgraduate exam success necessitates work-study & work-life balance.
- Time on task, self-regulation to task demands is needed when assessments are tougher and high stake.
- Exam preparedness: A collective attribute is proposed with a questionnaire to measure predictability of exam success.
- Shunning away from 'shame of mock vivas' spirals down to poor chance of passing.

## I. INTRODUCTION

Postgraduate summative examinations have an important role in progress as a medical professional. Success in high-stakes assessments have an impact on societal impressions, career shifts and social strata changes

(Hamilton & Brown, 2005; Slavin et al., 2014). Examinations ideally measure the students' competencies, but there are reasons to think that there are factors other than academic predictors.

Learning strategies and monitoring vary across the age groups (Vermunt, 1996). High school education and learning require mastering declarative knowledge, largely through elaboration and rote memory. College students require advanced learning strategies involving skilful metacognitive knowledge monitoring (MKM) and self-regulatory strategies (SRL) (Isaacson & Fujita, 2006). *Metacognition* is the higher order mental process of “thinking about one’s thinking”, wherein, there are two aspects, namely the ability to reflect on the quantity & quality of knowledge acquired (MKM) and the operational strategies in pacing and preparing for the challenge ahead (SRL). Educational programs strive to facilitate this transition to become ‘adult learners’ (Ormrod, 2009).

Learning in undergraduate medical education requires ‘critical reasoning’ to assimilate relevant clinical information and deduce differential diagnoses. Postgraduate learners, particularly in the health professions, need self-regulatory skills to pace their self-directed learning in the absence of regular formative assessments. Zimmerman (2008) asserted that postgraduate learners in higher education possibly achieve superior standards of self-regulation and motivation. However, the adaptations in learning strategies or metacognitive regulatory activities are not well described in the context of postgraduate health professions. Soh (2019) described a six-step approach in the pretext of the ‘ownership cycle’ for supporting postgraduate learners with difficulty.

O’Connor and Paunonen (2007) urged researchers to ‘use multiple predictors beyond intelligence, such as personality, motivation, and study habits when predicting academic achievement’ (Ray & Brown, 2015). We set to explore how we can improve on the understanding of attributes that could be collectively stated as ‘exam preparedness’ (Appendix 1). We proposed to **define** ‘exam preparedness’ as:

*“ability of the learner to inculcate **educational situation awareness**, to gauge task difficulty, assess self-efficacy, modify one’s own learning behaviour, manage self and moderate it with resources and personal capabilities, so as to plan and operationalise a scheme/ construct in exam taking aptitude & skills, resulting in comprehensive exam success”.*

It is known from literature that testwiseness, “a subject’s capacity to utilise the characteristics and formats of the test and/or the test taking situation” could impact the outcomes of the examinations (Millman et al., 1965; Sarnacki, 1981; Wahlstrom & Boersma, 1968; Watling & Ginsburg, 2019). Our proposition of understanding

‘exam preparedness’ is more than coachable test-taking strategy of testwiseness, but on a broader holistic front that looks at emotive, behavioural, self-regulatory perspectives and preparedness for a task in anticipation.

## II. RELEVANCE OF THE STUDY

We need ways to measure ‘exam preparedness’ because, first, it could help the postgraduate learners to identify major deficiencies in being task focussed and hone self-regulatory strategies. Second, it would help teachers to enhance support or ‘scaffolding’ that suits the needs of individual students. The concept ‘exam preparedness’ is not well constructed or described in literature. In the context of this research, we identify ‘exam preparedness’ to be everything but the student’s level of knowledge or competence. The cognitive determinants, like grade point average (GPA), are strong predictors of college success (Conard, 2006; Sladek et al., 2016; Zhou et al., 2014). In the postgraduate medical education context, where the academic capabilities are comparable and are well matched during their selection into residency, there are other non-academic attributes that could predict exam success.

The prediction of exam performance by factors such as achievement goal orientation, self-regulation, (Lucieer et al., 2016) conscientiousness (Brazdău & Mihai, 2011; Colthart et al., 2008), metacognition and meta-comprehension have been well described (Cook et al., 2011; Dunlosky & Lipko, 2007; Pintrich & De Groot, 1990; Zimmerman, 2000). The inter-relationships among these attributes are complex and not well studied. Our work was designed to help understand postgraduate students’ metacognitive, self-regulation, conscientiousness, and self-efficacy perceptions to aid in their learning.

## III. METHODOLOGY

### A. Study Design

The study involved a sequential explanatory mixed methods research design (McKim, 2017). The attribute of ‘exam preparedness’ was explored using existing predictors of academic success such as metacognition, self-regulation, self-efficacy and conscientiousness quotient. Data obtained by a questionnaire assessing pre-examination attributes were compared with the students’ reflections through focus group discussions, after the formal declaration of results. The mixed methods design consisted of ‘*sequential approach*’ where the questionnaire data collected prior to the high-stake examination provided inputs for quantitative analysis of the predictors of exam outcomes. This was followed by qualitative exploration of themes that emerged through focus group discussions. The themes summarised from the first focus group discussions were used to enhance

the richness of second focus group discussion (Hennink, 2013).

### B. Procedure

Anaesthesia postgraduate learners who appeared for the primary anaesthesia examinations were invited for participation in the study. These were high-stake summative examinations and mandatory for all postgraduates, limiting progression to senior years in residency and subsequent accreditation to a specialist. Informed consent was obtained for voluntary participation and confidentiality was ascertained for information on participant profiles and sensitivity of information about personal learning attributes. After approval by the institute review board, a pilot study was conducted to enhance validity of the questionnaire.

All the study participants who consented (30 out of 42 who appeared for exams) filled the pre-examination questionnaire, one month before the examinations. After completion of examinations and declaration of results, focus group interviews were conducted among students who passed the exam to explore further insights. Candidates who had not passed the examinations were excluded from the second part of study (as per Institutional Review Board (IRB) stipulations). The 'passers' were allocated into two sub-groups: the first-time passers or the 'acers', who succeeded in their first attempt and the 'non-acers', who were postgraduates with previous unsuccessful attempt(s) and have passed the examinations in this attempt (Figure 1).

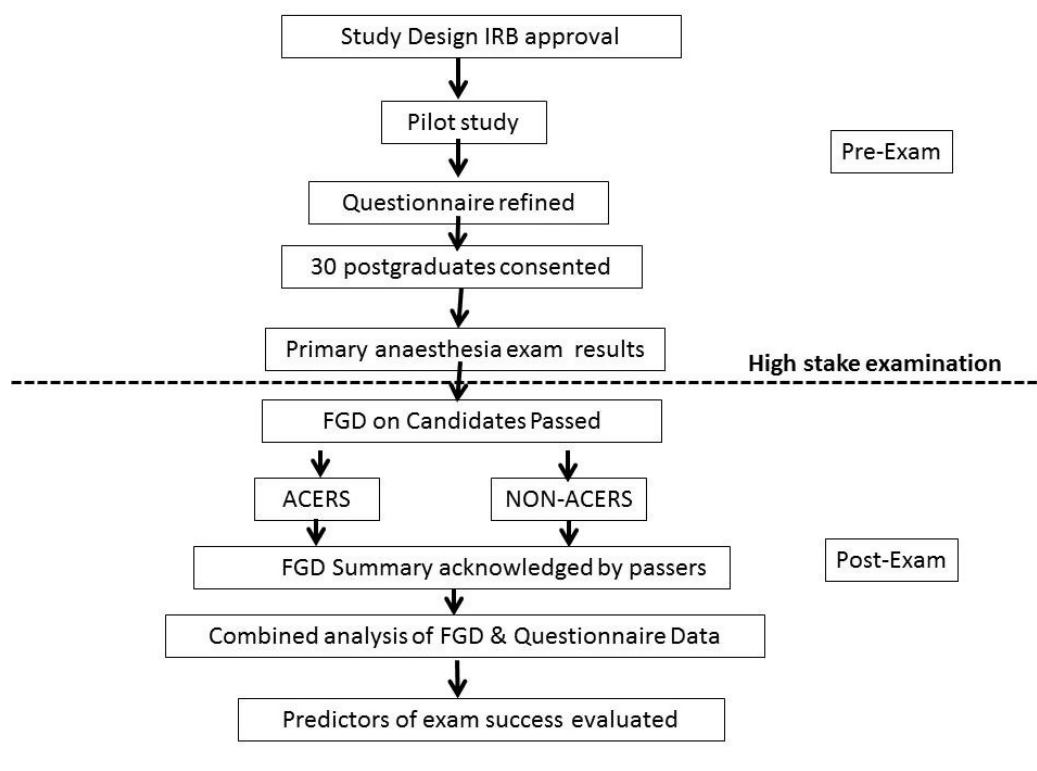


Figure 1. Procedure of the study in chronological order

After completion of focus group discussions, the results were summarised and sent back to the participants for authenticity and approval of the content (member checking). Data analysis with mixing of the quantitative and qualitative data was conducted to appraise pre-examination attributes evaluated through the questionnaire with themes that emerged from the post-examination focus group discussions.

### C. Instrument

A 50-point questionnaire was designed to understand the pre-examination attributes of the postgraduate residents when they had to face a high-stake assessment. The chief themes (Table 1) that were explored included the self-regulatory aspects of cognition, motivation/affect, behaviour and context that were adopted from the Motivated Strategies of Learning Questionnaire (MSLQ) (Credé & Phillips, 2011; Pintrich & De Groot, 1990; Pintrich, 2000).

Themes/ Attributes	Definition	Existing scales/ comments	Simple meaning
Metacognition & Self-regulation	<i>'the people's knowledge of their own learning and cognitive processes, as well as their regulation of those processes to enhance learning and memory' (Ormrod, 2009)</i>	MSLQ (Motivated strategies for learning questionnaire, 81 items) (Pintrich & De Groot, 1990)  MAI (Metacognitive awareness inventory, 52items) (Schraw & Dennison, 1994)	Metacognition= thinking about one's thinking  Self-regulation= ability to pace one's own efforts to task
Self-efficacy	<i>'personal judgments of one's capabilities to organise and execute courses of action to attain designated goals' (Colthart et al., 2008)</i>	SES (Self-efficacy survey, 150 items) (Zimmerman, 2000, 2008)	Self-perception of effectiveness
Conscientiousness	<i>'a broad domain encompassing individual differences in the propensity to follow socially prescribed norms for impulse control; to be goal directed, planful, to be able to delay gratification and to follow norms and rules' (Roberts, et al., 2009).</i>	CQI (Conscientiousness quotient inventory, 62 items) (Brazdău & Mihai, 2011)	Self-disciplined planful and perseverant  Conscientiousness is one of the big 5 personality traits with well validated proven predictors of academic performance

Table 1. Major themes in pre-examination questionnaire

Note: Table showing the basic themes of the questionnaire and the existing published scales used for measurement of each of the attributes from which the questionnaire was developed.

The sections A-B of the questionnaire addressed time on task, study strategy, goal orientation and task preparedness. These were complemented with questions exploring students' approach to learning in sections C-D (Pintrich, 2004). Personality traits and themes appraising the proven predictors such as conscientiousness were deduced from the Conscientiousness Quotient Inventory (CQI) (Brazdău & Mihai, 2011). In Section F, the questionnaire addressed the postgraduates' reflection on how they handled the situation with 'work-study' and 'work-life' balance, through subsections on procrastination, handling distractions and rejuvenation (taking time off). Metacognition and self-efficacy were appraised in sections E & G with questions adopted from metacognitive awareness inventory (MAI) and self-efficacy scale (SES) (Coutinho & Neuman, 2008; Schraw & Dennison, 1994). These included questions on the residents' own regulations of their learning such as choice of study resources, environment, effective study group dynamics, self-rated confidence, preparedness and understanding of impact of high stakes of the examination. The questionnaire was constructed with subsections that had reliability value of more than 0.7 in prediction of academic performance.

#### D. Purposive Sampling: Focus Group Discussions

The focus group discussions were conducted with semi-structured interview guides that were designed from the pre-examination questionnaire results. The questions

were designed to be 'open-ended' and to understand 'exam preparedness'. The interviewing faculty were carefully chosen to be neither the exam-trainers nor the exam-assessors, to minimise 'observer biases' and to remove confounding from 'power' relationships. The focus group structure included the investigator as the primary interviewer, while the information and discussions were captured through field notes by an assistant present inside the room. Audio or video recording were not permitted by the IRB for this study. To understand the perspectives of 'failing' and 'what it takes to bounce back and succeed', the 'non-acers' focus group was designed. These included students who had the experience of failing in previous examinations and have now succeeded in the present effort.

#### E. Analysis

For the questionnaire data, descriptive statistics were computed with SPSS 20 (IBM, Armonk, NY, USA). The data analyses were carried out in three stages. First, the pre-exam questionnaire data of the passers were compared with the questionnaire data from the failed candidates to obtain any common patterns or contrasts. Unpaired t tests were performed to obtain the statistical significance of the questionnaire data comparing the two groups. Owing to limited size of the sample ( $n < 60$ ), no formal logistic regression could be performed.

Next, the focus group reflections of the candidates were compared between the sub-group of passers into ‘acers’ and ‘non-acers’. Thematic analysis was performed with initial codes applied during preliminary analysis and further confirmed as themes that consistently emerged in the subsequent focus group discussions.

In the final stage, the focus group discussion data were compared with pre-exam questionnaire attributes of the candidates for understanding the predictors of exam success and to strengthen the construct of ‘exam preparedness’.

#### F. Ethics

National University of Singapore institutional review board approved of the study (IRB:13-276) and focus group discussions were permitted only with candidates who passed the exams. The study was voluntary, and participants were empowered to opt out at any phase of the study.

### III. RESULTS

Forty-two candidates appeared for the primary anaesthesia examinations. Of the 42 primary anaesthesia examination candidates, 30 (n=30) gave consent for the study and filled the pre-examination questionnaire (70% response rate). The overall pass rate was 42.9% (18 out of 42 who appeared for the examinations). 18 out of the 30 candidates who filled the questionnaire passed the exam. One candidate who had appeared for two concurrent primary exams (United Kingdom & Singapore) was excluded from the analyses as she might have received additional exam support. Hence, total number of study participants who passed the examination were 17, of which, 12 had passed the exam in first attempt (acers) and five had succeeded after previous attempts (non-acers). Of those who passed the exam, eight students participated in focus group discussions in two groups (acers and non-acers) of four each. The pass and fail groups were compared based on the various themes of the questionnaire such as study strategy, study time, goal orientation, self-regulation, metacognition and conscientiousness (Table 2).

Attributes	Feature assessed	Passers Subgroups		Passers (17/29) %(n)	Failed (12/29) %(n)
		Acers (n=12)	% Non-Acers (n=5)		
<b>Study Time</b>	Average weekday study time <2 hours / day	25(3)	20(1)	23.5(4)	83.3(10)
	Average weekend study time >6 hours in total	75(9)	80(4)	76.5(13)	33.3(4)
<b>Study strategy</b>	Timetable-based pattern of study	41.7(5)	60(3)	47.1(8)	16.7(2)
	Weekly Review of timetable	50(6)	60(3)	52.9(9)	33.3(4)
	Revisions for exam >= 2 times	66.7(8)	80(4)	70.6(12)	41.7(5)
<b>Goal Orientation</b>	Mock SAQ exam set rehearsals (Atleast once)	91.7(11)	80(4)	88.2(15)	50(6)
<b>Self-regulation</b>	Insufficient material covered <50 % only	9.1(1)	0*	5.9(1)	41.7(5)
<b>Conscientiousness</b>	Set Targets achieved <50 % only (procrastination)	16.7(2)	0*	11.8(2)	41.7(5)
	How prepared: feels <50% only	33.3(4)	20(1)	29.4(5)	41.7(5)
	Rejuvenate >= 2 times/ week	33.3(4)	60(3)	41.2 (7)	50(6)
<b>Self-efficacy</b>	> 50 % Confidence to face exams	41.7(5)	80(4)*	52.9(9)	41.7(5)
<b>Metacognition</b>	Study location: home	33.3(4)	80(4)	47.1(8)	75(9)
	Study with: solitude	58.3(7)	60(3)	58.8 (10)	83.3(10)
<b>Demographics</b>	Marital status: single	83.3(10)	20(1)	64.7(11)	66.7(8)
	Gender: Male	33.3(4)	60(3)	41.2(7)	50(6)

Table 2. Subgroup comparison within passers and with failed candidates

Note: Table showing questionnaire data demonstrating differences between the two groups of passers and their comparison with the ‘failed group’ of candidates. Acers=first time passers; Non-acers=candidates who failed before but have succeeded in this attempt. The percentages are calculated in relation to the column header on top of respective rows. (\* denotes statistical significance with p value<0.05)

#### A. Time on Task & Self-Regulation

The passers spent more weekend hours for study (average > 6 hours, 76.5% vs 33.3%) and far more of

them planned their study using a timetable (47.1 % vs 16.7 %) (p value 0.036). Where they were timetable-based, passers reviewed their study plans weekly (52.9%

vs 33.3%). Passers revised the study materials more often than those who failed (70.6% vs 41.7%). Passers perceived that they covered more study material sufficiently (5.9% lapses to cover in passers vs 41.7% in failure group, p value 0.05). The focus group discussions revealed that postgraduates who passed had higher self-regulation, covering larger volumes of sufficient material required. This was more prominent in the ‘non-acers’ who had failed before. The focus group discussions showed that the candidates rated the attribute of *self-regulation as the most important quality* to succeed in exams. The candidates felt that *‘diligently apportioning time, effort & resources, knowing to map what examiners want and selectively consolidating preparation’ (effort regulation)*, were predictive of exam success.

### B. Self-Efficacy

Passers procrastinated less (perceived self-assessment of set targets achieved) with their study plans (11.8% vs 41.7%, p value 0.057). The focus group discussion showed that *group study and external support* through peers and seniors were vital in providing individualised attention & feedback to stay focused on track. They asserted that *‘being planful, persevering to achieve more than 50% schedule, pushing one another in striving to achieve that goal’* helped to pass.

### C. Conscientiousness

The non-acers scored higher (p value < 0.05) on conscientiousness (lesser procrastination) when compared to the failed candidates. Both groups took similar efforts to rejuvenate and recuperate, showing no difference (with p value > 0.05), with no specific patterns in how postgraduates prepared for the high-stake assessments.

### D. Additional Themes

Social factors like marital commitments (64.7% passers-single) and gender (41.2% passers-male vs 52.9% female) showed little difference (p value 0.335) in overall exam outcomes. Yet, subgroup analysis showed that among the passers, 83.3% of first-time passers were single and only 20% of those who were married passed in first attempt (Table 2). The study environment and study in solitude vs groups were comparable. On further elaboration in focus group discussion, the residents affirmed that not all the study-time with peers involved discussion, but the fact they all studied together helped them to *‘stick together and push each other to the very end’* (Table 3). The ‘non-acers’ study strategies were comparable to the ‘acers’ and they tend to study longer and plan their study ‘more timetable-based’ and reviewed it more often.

Themes	Acers	Non-Acers	Common features
The Primary Exam: general impressions	<b>Internalised factors:</b> need deliberate effort, sacrifice, push on to end, set aside time, less social life	<b>Externalised issues:</b> exam not structured, mark allocation not clear, no syllabus, no guidance, prep time not enough; requires senior guidance	Work study balance difficult Primary exams a hindrance to progress in career
Level of task difficulty	Toughest of exams, difficult content to recall/ remember	Need to know relevant knowledge (not a lot), Technique: structure/ how to answer is vital	Task difficulty same throughout prep stages
Difference from past success	More deliberate effort; perseverance & discipline; not spoon fed like in UG	More applied sciences content involved	Work study balance needed
Adaptations when facing exams	<i>Not to chance a failure;</i> adapting study style to exams; perseverance	<i>Failure is a possibility;</i> lots of practice; stay back post call to study; Technique: direct answers, open ended, forth coming answers	<b>Group study:</b> push each other, enjoy same things, reinforces prep <b>External / senior help:</b> personalised attention, helps focus and formulate
What went well as planned?	Being in groups; Study material completion	Exam goal-oriented selective study; more viva practice	<b>Study plan:</b> timetable based; efficient completion; cover 50-75% plan; not giving up
Perceived reasons for failure	Not being ready in many ways	Bad luck; unsupportive hostile examiners	Gross lack of knowledge
What to improve if rewind to 6 months before exam?	Unpreparedness is an issue to avoid; minimise luck factor; get resources that answers / on syllabus on what examiners want	Do past year questions to know the areas of focus; study leave at least two weeks	Start earlier; push timetable better; syllabus-oriented prep; learn examiner mapping & prepare / practice so

Exam preparedness: predictable qualities	Knows weak & strong spots; knows a bare min of everything; consolidates prep to what examiners want	Not fumble under pressure	Know well what examiners want; smartly choosing enough material; technique/ way to answer exam question
Breezing through exams: qualities	Being in tune with recent exam patterns; not giving up	Strong memory in foundational sciences- chemistry physics; enough material not lots of it	Structured diligent exam-oriented prep Flexibly tied in plans Expressive in viva Delivers the wanted
Advice for future candidates	Minimise luck factor Stick to study plan Handling burn outs to avoid study plan disruptions	Having good social exam taking attributes Small textbooks are useful more resources	Not to shy away from shame of mock viva. Know examiner needs. Know syllabus well & Plan the study and technique

Table 3: Focus group discussions summary

### E. Recipe for Exam Success

The main themes emerging from the two focus groups are summarised in Table 3. All focus group discussion candidates agreed that failure was chiefly a result of ‘gross lack in knowledge’ and ‘un-preparedness in many ways’. The focus group discussions concluded with the passers’ advice for success of future candidates and stated that:

*“adhering to syllabus & plan of study, technique suited to examiner needs and not shying away from shame of mock exams, minimizing luck factor, possessing good social attributes (viva skills), persevering with study plans and timing of rejuvenation was the key to success”.*

The focus group discussions supported this concept that ‘the best way of passing the exam was to dare the shame of practice viva’ and not to shun away from faculty feedback on performance in mock exams. The ‘passers’ had spent twice the time and effort in practice exams and revisions when compared to the ‘fail’ group (self-regulation).

## IV. DISCUSSION

Our study showed that the candidates who passed, monitored their learning well by choosing to stay in groups and ‘stuck together’ by helping one another. The focus group discussions showed that they opted to adopt this mode of studying because the task was difficult and required constant motivation and peer support. This is in accordance with literature that claims the usefulness of peer support and feedback (de la Cruz et al., 2015; Dochy et al., 1999; Lerchenfeldt et al., 2019). What is vital was the ability of the candidates to assess what components of the exam content requires concentrated self-learning, like memorization, and differentiate it from study materials that require learning in groups and further elaboration.

Our study showed that the ‘passers’ were mindful of how they took time off to study or rejuvenate. The ‘passers’ tend to procrastinate three times lesser than the ones who failed. More so, a subgroup analysis showed that the ‘non-acers’ or the previous failed candidates never put away their schedules and stayed pursuing a *timetable-based study* (0% procrastination). The focus group discussions reinforced the fact that the ‘passers’ felt that there were loads of enormously difficult basic science content to be covered, such as applied physics and pharmacology, and time was limited, requiring further organisation and seamless execution of the study plan.

Self-efficacy evaluations showed no clear difference when comparing the groups of ‘passers’ and ‘failed’ candidates. However, the subgroups analysis showed that the ‘non-acers’ were twice as confident as the rest. The focus group discussions confirmed that the non-acers, having had the experience of failing before, ‘had a clear understanding of the difficulty of task and had commenced their study early in a programmed timetable-based manner with specific feedback and personalised attention from faculty supporting them’.

Cilliers et al., (2012) modelled the pre-assessment learning effects of high-stakes assessments and postulated ‘efficacy’ as an adaptation in the learner in anticipation of the task. Our ‘non-acers’ had been through the actual task difficulty, having failed earlier, had higher self-efficacy and now programmed their study well, expending more time on task. The lower self-efficacy might mean that this is an important lead for the faculty, in how they counselled and supported future candidates that are to be trained for high-stakes examinations (Lucieer et al., 2016).

### A. *'The Exam Ready Candidate'*

Our study showed that passers had higher degree of self-regulation, conscientiousness, and metacognition. The focus group discussions further affirmed the information about the relationship between the various attributes and the students' perceptions of 'exam preparedness'. They felt that the candidates who **'breeze through exams'**, in other words, the exam ready, *'possessed exam oriented (goal oriented) flexibly tied into study plans (metacognition), were expressive in viva (self-efficacy), delivered the necessary content well (conscientiousness)'* in addition to *'diligently apportioning time, effort & resources (effort regulation), knowing to map what examiners want & selectively consolidating preparations (study strategy)'*.

### B. *Understanding the High Failure Rates*

The anaesthesia postgraduate primary examinations had a dismal 42.9% pass rate while undergraduate examinations had more than 90% pass rates. This is intriguing and highlights the complex relationships between the poor predictability of undergraduate academic scores and the influences of other paradigms in postgraduate exam performances (Division of Graduate Medical Studies [DGMS], 2013). The focus group discussions helped us understand this phenomenon better. The residents felt that *'unlike undergraduate exams, the postgraduate examinations required lot more application of work-study balance and work-life balance'*. During the undergraduate years, the students felt that the sole focus was to learn and perform in examinations, with lot more protected time during the day and all the weekends were dedicated to study. Although they require a particular level of academic competence to become a postgraduate, there is more to explore when it comes to exam success such as 'work-life' and 'work-study' balance (Klomegah & Yao, 2007; Rau & Durand, 2000).

### C. *Practical Implications*

Through this study, we identify the presence of attributes such as metacognitive self-regulation, conscientiousness, and self-efficacy. We now know that candidates who score well in these component-attributes tend to pass the examinations. We propose that achieving an element of predictability will be a good lead for:

1. The **educators** to identify the **'candidates with difficulty'** and delegate special care and personalised attention to them, while it is feasible and not too late.
2. The **exam candidates** themselves to have a **'reality check'** on where they stand and what would be the best way ahead: peer learning, consolidated study, goal orientation etc.

### D. *Scoring Exam Preparedness and Planning Scaffolding*

Candidates with *'poor conscientiousness score'* could be scheduled to 'receive more structured assistance through study groups, frequent deadlines, shorter assignments, group assignments and clearly defined learning goals' (Kappe & Van Der Flier, 2012). This was put to light in our focus group discussions when one of the candidates who was unsuccessful earlier, but passed this time (non-acer) stated that:

*"what made all the difference in this exam was that faculty and peers sat next to me in a quiet room, gave me a short study topic, made me do a SAQ, then a short viva on it, then gave me a critical feedback on how to improve. This was very encouraging, and I felt the intention of the faculty and peers were to help me and not to embarrass me on how unprepared I was. This inspired me to pass this ordeal this time..."*

Implementing a composite tool to assess 'exam preparedness', we propose, would help the learners and teachers to skim for predictable factors that influence the chances of success. Incorporating a system of 'scaffolding' would help in early guided learning towards exam success. This, we feel, is particularly imperative when educational programs deploy high-stakes single summative exams. Self-efficacy Survey (SES) was described as a measure for identifying disability in adaptive attitudes and dysfunctionality (Panc et al., 2012). Using such a measure could identify 'trainees with difficulty' and guide us to channelise our efforts and resources for those who need it the most. Kandaswamy and Anbarasi (2014) suggested early identification of *'gifted under achievers'* and successfully devised a structured program for psychological support, demonstrating a reduction of dropouts for dental undergraduates.

### E. *Limitations & Reflections*

The chief limitation our study was the aspect that attributes like metacognitive self-regulation, conscientiousness and self-efficacy have considerable overlapping concepts and it was difficult to compartmentalise these themes when interpreting the qualities of a learner. Our study population was limited to anaesthesia postgraduates' primary examination results from one country. A fair comparison of other specialty postgraduate examinations could not be accomplished in our context owing to variation in exam task difficulty, timings, and patterns of assessments.

Of the 42 who appeared for exams only 30 consented to fill the questionnaire. *Only one among the 12 students*



who chose not to fill the questionnaire passed the exam. This could have been another area of rich information. Did the learners know that they were not prepared at all or was the title labelling students “exam smart” made them to excuse themselves off the study? It is possible that respondents gave ‘socially acceptable answers’ when the questionnaire was given, especially so when our study is titled to explore how ‘prepared/ ready’ they were or predicting their chance to pass.

There are possibilities that testwiseness could have contributed to exam success and were not explored in the focus group discussions (Millman et al., 1965; Sarnacki, 1981; Wahlstrom & Boersma, 1968; Watling & Ginsburg, 2019). Though the present study involved short answer questions and viva-based examinations that tend to report less of testwiseness, as compared to multiple choice questions, future research could appraise this concept and consider ways to address that in the methodology.

1) *Validating a questionnaire for ‘exam preparedness’- A lead for the future.* Our model of ‘exam preparedness’ was proposed to address the complex learning and myriad of factors that impact postgraduate academic performance (Appendix 1). A well validated composite score or scale on ‘exam preparedness’ can be a yardstick for ‘assessment for exam-readiness’, thereby planning the allocation of resources and faculty time and effort. Future studies could evaluate when it would be an appropriate time for evaluating the score (1 or 3 or 6 months before exams). It should not be too near to the examinations, lest it could be too late for any usefulness of its predictability.

## V. CONCLUSION

There were similarities in attributes that characterise passing such as *time scheduling, plan of study, group and peer support, goal oriented selective mastery learning and effort regulation to task difficulty*. The two groups of passers also identified that the chief cause of failure to be ‘gross lack of knowledge’ and ‘unpreparedness’. Implementing a composite tool to assess ‘exam preparedness’ we propose, would help the learners and teachers to skim for predictable factors (metacognitive self-regulation, self-efficacy, conscientiousness) that influence the chances of success.

As teachers, we would agree that the students who are relatively more prepared, tend to seek and receive more faculty support, while those who are trailing, continue to distance themselves with the divide getting more distinct nearer to the examinations. Identifying this discrepancy early, while predicting and preventing failure in high-

stakes examinations, we propose, needs in-depth understanding of ‘exam preparedness’. Using the ‘exam preparedness’ scale might help to identify the postgraduates with academic difficulty, thereby offering a support system, wherein we don’t lose some ‘*Good Samaritans*’ who are just not ‘exam ready’.

## Notes on Contributors

Dr Balakrishnan Ashokka is an Anaesthesiologist & Educationalist with special interest in Simulation-based postgraduate education at National University Health System, Singapore. He conceived the idea of the study, performed literature search, conducted the study, and drafted the manuscript of the study. He agrees fully to the final version of manuscript.

Prof Lee Tat Leang has been involved in Undergraduate and Postgraduate teaching and examination processes over 30 years at the National University of Singapore. He provided support during conceptualisation, discussion of results and creation of the manuscript. He fully agrees to the final version of the manuscript.

Dr Daniëlle M.L. Verstegen has a background in Cognitive Science and Instructional Science. She currently leads an e-learning group in the Department of Educational Development and Research, FHML, Maastricht University. She supervised the conduct of the entire study, qualitative analysis and agrees fully to the final version of the manuscript.

## Ethical Approval

The National University of Singapore, Institute Review Board (NUS-IRB) provided the ethics committee approval for the conduct of study on passers of the examination (NUS-IRB approval number NUS 1946, reference code 13-276). No audio or video recording or discussions with failed students was permitted as per the directorate’s policy of research on exam candidates.

## Data Availability

The study data with summarised, deidentified data synthesis is provided in tables 1-3 in this manuscript. The NUS-IRB and DGMS had provided approval for the study with a clause for private storage of study data with authors’ password-protected workstation. No permission was granted for open access platforms, as the data contained sensitive information about failed candidates.

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## Declaration of Interest

The authors declare that there are no financial or non-financial competing conflicts of interests.

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**SUPPLEMENTARY INFORMATION**  
**Theoretical modelling of Exam preparedness**

