

Emergency medical care students' perceptions of contributors to stress and anxiety during simulation-based assessments: A pilot study

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ABSTRACT

Background: Simulation-based assessments (SBAs) are known to be stressful for students and may induce anxiety. Stress and anxiety have the potential to negatively affect student performance in assessment.

Methods: This pilot study employed a qualitative, descriptive methodology. Emergency medical care (EMC) students were invited to participate in the research. Due to the scope of the project, six participants were interviewed. The data were collected through one-on-one interviews, which were recorded at the time of interview then transcribed verbatim, manually coded, and then grouped into categories and themes.

Results: One theme and five sub-themes emerged from the interviews. The theme that emerged was that participants experience anxiety during SBA that leads to stress. The sub-themes that emerged are that: the academic impact of the simulation assessment drives anxiety; waiting in a common area causes anxiety to build; a fear of scrutiny exists; lack of simulation fidelity and technical issues cause anxiety; and comparing their actions to their peers' caused self-doubt and anxiety.

Conclusion: This research identified various aspects that drive anxiety and stress during SBAs. Educators can use this information to create a setting which limits these factors should they wish to reduce stress and anxiety in their students.

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Background

Simulation-based learning is an educational technique that is applied to numerous disciplines. In healthcare training, it is designed to replace real clinical experiences with a simulation, which replicates substantial aspects of the real world in a fully interactive fashion (La Cerra, Dante, Caponnetto et al., 2019; Labrague, McEnroe-Petitte, Bowling, Nwafor & Tsaras, 2019). In clinical programmes, simulation learning is scaffolded in such a way that the student first learns very basic psychomotor clinical skills, and as they progress through the course, the skills that they learn become more complex and are later integrated with clinical reasoning such that the student eventually manages a patient holistically (Bauer, Heitzmann & Fischer, 2022).

Simulation allows the student an opportunity to master skills of various levels of complexity in a safe environment, where real patients cannot be harmed (Labrague et al., 2019; So, Chen, Wong & Chan, 2019). This considered, including simulation learning in a curriculum has become a hallmark of quality in the education of health professionals (Brazil, Purdy & Bajaj, 2019; Lamé & Dixon-Woods, 2020; Koukourikos, Tsaloglidou & Fratzana, 2021). The extent of the benefit gained by using simulation for teaching, learning, and assessment is immense, and carries through to the assessment environment, where students can all be assessed on the same clinical scenario - which facilitates consistency in the assessment process, and ensures an assessment environment where no patient harm can take place, but where a student's practical skills can be assessed (Seam, Lee, Vennero & Emler, 2019).

SBA's are used to assess advanced cognitive, diagnostic, and therapeutic management skills, as well as to test the students' ability to integrate knowledge, critical judgement, communication, and teamwork in a simulated learning setting (Bogossian, Cooper, Kelly, McKenna & Stark, 2017). Although the value of SBA's is undeniable, they are known to be stressful for most students (Nakayama, Ejiri, Arakawa & Makino, 2021; Stecz, Makara-Studzinska, Bialka & Misiolek, 2021; Peek, Moore & Arnold, 2023), and to induce high levels of anxiety for some EC students (Stein, 2020; Sobuwa, 2023).

Stress is the physiological, hormonal, and psychological response to a stimulus (Stecz et al., 2021). Stress leads to activation of the sympathetic nervous system, which results in: the release of cortisol; an increase in heart rate; decreases in heart rate variability; and pupil dilation (Chang, Beshay, Hollinger & Sherman, 2019). Although not all students who experience stress experience anxiety,

there is evidence which suggests that the majority of participants in SBAs are experiencing stress (Bong, Fraser & Oriot, 2016; Rogers, Andler, O'Brien & van Schaik, 2019; Stein, 2020; Oriot, Trigolet, Kessler & Auerbach, 2021). Long-term and uncontrolled stress can reduce the success and efficiency of a student's educational experience (Stecz et. al., 2021).

Anxiety is a psychological manifestation of stress and occurs when the stress or fear of a situation becomes overwhelming for an individual (Yockey & Henry, 2019). Anxiety can be described as an exaggerated psychological response to a threat which does not justify that response (Abelsson, 2019). The anxiety that is induced by a situation is linked to an individual's perception of the discrepancy between the demands on them and the resources present in a particular situation (Abelsson, 2019). When a person feels that the resources available to them are inadequate to meet the demands of the situation, they may experience anxiety (Yockey & Henry, 2019).

Some students do, however, experience positive benefits from the pressure derived from a stressful experience. In cases where students feel adequately prepared, the stressor (the assessment) is interpreted as a challenge to be overcome, as opposed to a threat to maintaining or achieving a desired goal (Al-Ghareeb, Cooper and McKenna, 2017). The stress associated with SBAs, however, may induce significant anxiety for participating students (Hollenbach, 2016; Rogers et al., 2019).

Leblanc, Regehr, Tavares, Scott, Macdonald and King (2012), Abelsson (2019), Stein (2020), and Sobuwa (2023) have described how simulation of prehospital cases induces anxiety for those involved in the simulation. This anxiety is generally not useful to the student as it can hamper performance by reducing the capacity of working memory (Leblanc et al., 2012; Moran, 2016). When the level of anxiety induced by the SBA is moderate, the SBA serves to challenge the student, however, when the anxiety experienced is excessive, cognitive overload can occur, which in turn impairs performance (Bong et al., 2016). Al-Ghareeb, McKenna and Cooper (2019) found that clinical performance during simulation was best amongst students with the lowest levels of anxiety, while Stein (2022) found a contrasting pattern, where both the students participating in SBAs who reported low anxiety, as well as those who reported very high levels of anxiety on the state trait anxiety index (STAI), performed well in the assessment (Stein, 2022). Stein postulates that this ability to achieve good academic results in SBAs despite high levels of anxiety could be due to the personal characteristics of EC students, coping mechanisms learned during exposure to real emergency cases during clinical learning, or good academic preparation for the assessment (Stein, 2022).

The effect of stress on cognition and appraisal has been investigated by several studies (Murugavadigal, Pal, B., Thein, Soe & Pal, S., 2020; Nakayama et al, 2021; Stecz *et al.*, 2021; Barbadoro, Brunzini, Dolcini, Formenti, Luciani, Messi et al., 2023). Stress can have varying impacts, but what is constant about the stress response is its potential negative effects on memory, attention, and decision-making ability (MacLean, Janzen & Angus, 2019). Stress can therefore inhibit the student's technical and non-technical abilities, thus impeding their ability to perform (Barbadoro et al., 2023).

Despite the fact that Stein (2022) indicated that some students with high levels of anxiety performed well in SBAs, the majority of the research indicates that stress and anxiety is likely to hamper performance (Al-Ghareeb et al., 2019; Lewis, 2019; Murugavadigal et al., 2020). Although assessment is primarily utilised to determine student competence, each SBA is also a learning opportunity for students (Bauer, Heitzmann & Fischer, 2022). If the stress and anxiety induced by the simulation is excessive, the student's ability to derive a meaningful learning experience is hampered, and the educator's ability to determine competence may also be affected (Ignacio, Dolmans, Scherpbier & Rethans, 2016). It is therefore important to identify the aspects that contribute to EC practitioner (ECP) students' stress and anxiety during SBAs, so that educators can better manage the level of stress and anxiety induced by these assessments. This led the researchers to the research question: which aspects contribute to ECP students' stress and anxiety during SBAs?

Design and Methods

Study Design

This research was conducted in partial fulfillment of a bachelor of EMC degree. For this reason, the scope of the project was limited. The aim of this pilot study was to identify the preliminary findings regarding the aspects that contribute to ECP students' stress and anxiety during SBAs. This qualitative, descriptive study made use of individual interviews to gather data from consenting participants to determine what emergency care students felt contributed to their stress and anxiety during SBAs. This research design was chosen because it allowed the researchers to explore and understand what it was participants believed contributed to their stress and anxiety during SBAs (Colorafi & Evans, 2016).

This study received ethical clearance from the University of Johannesburg (UJ) Health Sciences Research Ethics Committee: Clearance number: REC-1648-2022, and approval from UJ's Institutional Research Division for permission to conduct research with students.

Research setting

This research took place at a South African university. The study was conducted using Zoom™ ('Zoom', 2022) online meeting software and Microsoft Teams™ (Microsoft Corporation, 2021) with participants from the Department of EMC. An online setting was convenient for the participants, as it did not require them to travel to an interview site, and increased the level of privacy during the interviews.

Population and sample: The population of interest for this study was the students registered for the bachelor's degree in EMC at a South African University in 2022 (i.e., ECP students). Students from all four years of study were invited to participate. EMC training in South Africa is limited, and so the total population of bachelor's degree in EMC students enrolled for this degree at the research site in 2022 was 110 students.

The ECP students in this study had all had exposure to SBAs during their studies, with senior students having experienced more SBAs than junior students. Once institutional permission and ethical clearance had been obtained, students were invited to participate through an invitation letter that was emailed by the researchers to the Head of Department (HoD) of EMC. The HoD subsequently sent this letter to the year co-ordinator for each year of study, who further disseminated the invitation letter. Students self-identified as willing to participate. Students who wanted to participate then directly contacted Sivesandzile Mhlalina Dlamini (SMD). Helen Slabber (HS) is a lecturer within the Department of EMC, and as such was not involved in sampling of students since all the students on the programme know her. Convenience sampling was used to identify the participants due to the undergraduate scope of this research project. SMD sampled participants from the pool of students who contacted him stating that they intended to participate in this research. First-year students who were under the age of 18 were excluded. Since this was a pilot study, six participants were interviewed.

Participant demographics

All the participants were registered in the Department of EMC at U J. Five of the participants were male and one was female. One participant was registered for the fourth year, three participants were registered for the third year, and two participants were registered for the second year. The table below also specifies how many years each participant had been enrolled at UJ. The participants' demographics are presented in the table below:

Table 1: Participant Demographics

Participant	Age (Years)	Gender	Years Enrolled in the Degree Programme	Year of Study
Participant 1	22	Male	5	4 th yr.
Participant 2	25	Male	4	3 rd yr.
Participant 3	24	Male	5	3 rd yr.
Participant 4	21	Male	3	2 nd yr.
Participant 5	20	Male	2	2 nd yr.
Participant 6	20	Female	3	2 nd yr.

Data Collection

Since HS was conflicted as she was known to the participants as a lecturer, SMD interviewed the participants. SMD was a final-year student registered on the programme at the time of the data collection. There is significant value in the fact that SMD was a peer of the students who were interviewed. It is likely that they would have been more comfortable to divulge their true experiences to a peer than to an interviewer where a power distance exists. During the online interview the participant and the interviewer had their cameras on to facilitate non-verbal communication. SMD took field notes during the interviews. Field notes were used to capture the context and emotions of the participants (Cresswell & Cresswell, 2022). The field notes and interviews were used together for data triangulation and data analysis. Data were further triangulated by considering the different viewpoints of the two authors on the data that were obtained, and by collecting responses from six different participants. A dense description of the data that were collected took place, which further aided the data triangulation process (Noble & Heale, 2019). The interviewer (SMD) initially made use of a single open-ended question, which was followed up by further probing questions. The opening question was:

“What do you think contributes to your stress and anxiety levels during SBAs?”

Data Analysis

The interviews were audio-recorded. The audio recordings were then transcribed verbatim by the interviewer. The transcripts were anonymised and labelled as participants 1-6. The transcripts were read and reread by SMD and HS independently. This was followed by data reduction which was used to determine which of the transcribed data contained significant information concerning the focus of the study, and to identify important incidences and similarities between the respective interviews (Saldaña, 2021). Coding and structuring then commenced. The researchers divided the reduced data into segments, assigning codes to the data that related to the theme being developed (Saldaña, 2021). The data were then aggregated into small categories of information, and this was analysed to determine whether it addressed the research question. These codes were expanded or reduced as the collected data were continually reviewed (Cresswell & Cresswell, 2022).

This coding process was performed by both researchers, independently, for purposes of triangulation (Noble & Heale, 2019). Saldaña's technique of manual coding using word processing software and its comment box function was used (Saldaña, 2021). The two sets of codes were compared and condensed during a consensus meeting. Theme building was the final stage of data analysis. This involved structuring the coded data according to themes and meanings that were derived from the data (Cresswell & Cresswell, 2022).

Measures of Trustworthiness

The authors used Lincoln and Guba's model of criteria to ensure trustworthiness (Cresswell & Cresswell, 2022). Credibility was ensured by using recognised techniques to perform the research; triangulation through use of multiple sources; and member checking. HS has experience in qualitative research methods and SMD was provided with training by an experienced qualitative researcher (Prof. K Henrico) for this project. Transferability was ensured through thick description of the methods used in this study. Dependability was ensured by thorough description of methods and the use of code-recode procedures. Confirmability was ensured by improving credibility and by transparent reporting of code and theme generation from the data.

Ethical Considerations

HS is a lecturer within the Department of EMC at UJ and was therefore not present during the interviews, and at no point had knowledge of the identities of the participants, so that no conflict of interest could arise. No power distance existed between SMD and the participants. Students participated by choice and were allowed to withdraw from the study at any point. Participants provided written consent to participate, and for the interview to be audio-recorded. Data were kept confidential through storage on a password protected computer in keeping with UJ's data storage policies. Transcripts were anonymised prior to HS gaining access to them.

Results

One theme and five sub-themes emerged from the interviews. Table 2 (below) presents the theme and sub-themes that were identified.

Table 2: Theme and Sub-themes

Theme	Sub-Themes
Participants experience anxiety during SBA that leads to stress.	The academic impact of the simulation assessment drives anxiety.
	Waiting in a common area causes anxiety to build.
	A fear of scrutiny exists.
	Lack of simulation fidelity and technical issues cause anxiety.
	Comparing their actions to their peers' caused self-doubt and anxiety.

Table 3 below demonstrates the process by which codes were categorised, and then subsequently analysed for the development of the five sub-themes (Cresswell & Cresswell, 2022).

Sub-theme: Academic impact of the assessment

Participants expressed their concern over how the results of the simulation would affect their course of study in the degree programme. Participants discussed how the goal of a simulation assessment is for it to be passed, and there was a concern over whether they would achieve a pass mark for the assessment, and how this might impact their ability to pass the year of study. The quotes below demonstrate the students' views in this regard:

Participant 2: "... sometimes the thought of knowing you're being assessed also contributes to that [stress]."

Participant 1: "You know when you are doing a 10% sim and you are like 'ah, it's nothing' and then there are those ones, like the ICU [intensive care unit] ones, the RSIs

[rapid sequence intubations], the ones that contribute a major weight to your final mark and you are wondering, if I fail this one then I'm failing the year."

Table 3: Codes, categories and sub-themes that were developed.

Codes	Category	Sub-theme
Examination-associated stress	Assessment stress	The academic impact of the simulation assessment drives anxiety.
Fear of mismanaging the simulation		
Inadequate preparedness		
Percentage weighting of the simulation	Mark obtained	
The desire for a positive outcome		
Fear of the unknown		
Previous failures		
Waiting area	Waiting area	Waiting in a common area causes anxiety to build.
Order of leaving the waiting room		
Anticipation of the simulation		
Assessor's demeanour	Scrutiny	A fear of scrutiny exists.
Being under scrutiny		
Limited realism of the simulation	Fidelity	Lack of fidelity and technical issues cause anxiety.
Technical issues		
Debrief of the simulation with peers	Doubt	Comparing their actions to their peers' caused self-doubt and anxiety.
Doubting one's performance		

The participants voiced experiences of increased stress following poor management of the patient during a simulation that can negatively impact their marks.

Participant 6: "If you make a mistake, it's suddenly more stressful and you need to correct for that, but you're under more stress, but the stress is what made you mess up in the first place. So, it gets worse and worse."

Participant 4: "Yeah, I think that's just one more point that might cause anxiety. Not knowing whether you've hit a critical point or not."

Further, the participants spoke about the pressure being increased when a student has failed a previous simulation, as they need to achieve a higher mark in the following assessments to pass the year.

Participant 6: "If you get a bad mark and you get bad feedback from your first sim then often the second sim that you go into, like I said at the beginning, the stress levels are higher because you know that you've made a mistake in the previous and so you are under more pressure to not make a mistake in the following sim, and then that can give you more stress and anxiety."

The UJ Department of EMC uses the simulation assessment tool for limiting assessor bias (SATLAB) (Makkink & Vincent-Lambert, 2020). This weighted matrix tool generates the mark that the student

obtains for the simulation assessment. When students perform actions that are harmful or potentially harmful to the patient, negative marking is applied (Makkink & Vincent-Lambert, 2020).

Participant 3: “The fact that there’s negative marking ... your hopes of passing decreases.”

The participants articulated experiences of stress and anxiety due to being insufficiently prepared for a simulation. Students admit that they do not always put in enough effort when preparing for SBAs, just as a student may not study sufficiently for a written assessment.

Participant 3: “What adds to the stress is being present with a patient and you don’t have a clue what’s going on because you aren’t prepared.”

Participant 6: “If I know that the scope of practice for the sim is something that I haven’t done a lot of practice for, that’s definitely more stressful than for something that I have practised.”

As with written assessments, the students do not know the exact clinical scenario that they will be asked to manage in their SBAs.

Participant 1: “I think one thing that contributes to the anxiety is the fact that you don’t know what [patient] you are going to get in a simulation.”

Participant 3: “I think it’s because of not knowing what they’re going to ask... so you go in there and you don’t know what to expect.”

Sub-theme: Waiting in a common area

Students at this university wait in a common area prior to their turn to do the SBA. The students are asked to wait here for academic integrity of the assessment, so that students who have not yet completed the SBA do not know which clinical scenario is going to be assessed. Participants in this study mentioned that waiting in this common area with other students contributed to their stress and anxiety levels. The following quotes describe the students’ experiences of waiting in a common area prior to the assessment.

Participant 2: “Honestly, I won’t want to lie, I hate the feeling. I hate being the last person, even the 3rd last person to leave the room, because of all those thoughts, and you can’t avoid them. Immediately when you get those thoughts, you just want to do your sim and then leave.”

Participant 5: “So before my simulation, everyone was so stressed, they were pacing around, and you know that different people have different methods of calming themselves down, that was not nice to watch, and it contributed to how I felt before my simulations.”

The quotes below show that the participants experience different stress and anxiety responses due to the order in which they leave the waiting area and are allowed to take their simulation assessment.

Participant 4: “I am often the last person to go for the sims, it only changed as of recently. When I used to go last, that waiting it just, its kills you know, because you are the only ones left in the sim room and your thoughts just go crazy...”

Participant 3: “It’s almost like they are leading us to our death because they are taking us to the sim room one by one. So that adds to the stress. Especially if you’re one of the last few in the room.”

The quotes below demonstrate that the participants’ stress and anxiety is worsened by waiting to take the simulation as they spend this time worrying about the nature of the simulation, in anticipation of the assessment.

Participant 6: “I do find that it's tense, it's stressful waiting for your turn because you know your turn is coming, so I think that’s stressful”.

Sub-theme: Fear of scrutiny

It was noted that some participants experience stress and anxiety due to being aware that they are being watched as they are assessed. Mention is made of the demeanour of assessors who are in the room during the SBA, and that that also impacts the students’ stress and anxiety.

Participant 1: “So yeah, as soon as you see, let’s say, for instance, four assessors in the exam room maybe plus one [facilitator] who is prompting, and you know in a simulation they have to look at what you are physically doing.”

Participant 6: “I find that the most stressful thing is doing things in front of other people and knowing that I'm being scrutinised, which is actually the most difficult thing.”

Sub-theme: Lack of fidelity and technical issues

Some participants noted that they experience stress and anxiety when simulation fidelity is hampered. The participants noted that some challenges are not experienced when treating real-life patients, as compared to these simulated cases. Further to the lack of fidelity, device malfunction and technical challenges were noted as being very stressful for the student who is being assessed, as they become distracted by the technical issues caused by mannequin malfunction.

Participant 1: “Unlike in the real-life scenario whereby you don’t have to say anything, I can just treat the patient silently, like completely silently.”

Participant 3: “I think, one other factor is unforeseen technical difficulties during the sim... The simulation environment was based on equal air entry but on their doll, the one side of the of the lung on the doll was not working.”

Sub-theme: Comparison to peers and self-doubt

The participants discussed how they experience stress and anxiety when they are engaged in activities that are associated with reflection on the events that transpired during the SBA, especially if they feel that the SBA did not go according to their expectations, or if they performed different actions to their peers during the SBA.

Participant 6: “When you finish a sim and you leave the venue and you either talk to the other students who have also just done the sim, or during the feedback session with the lecturers afterwards when the marks are released, then you figure out certain things that you might have got wrong.”

Participant 3: “The fact is, you’ll go to your friends afterwards, and they did one thing, and you did something completely different. For example, if your friends gave morphine and you didn’t give morphine, it’s quite stressful.”

The quotes below demonstrate that some participants struggle with self-doubt, and this contributes to their anxiety, as they are concerned about whether their clinical actions during the SBA were correct.

Participant 3: “Whilst you are still busy doing the sim they will ask you questions “did you say this” or “did you mean this” or “what dose did you give, what drug did you give”, while doing that, it almost makes you second guess yourself: ‘Oh, maybe I’m not supposed to do that’.”

Participant 1: “You know, now there are people looking at you and, in your mind, you are wondering ‘am I doing something right?’ and you know the looks, when you are doing something, even if it's not a bad thing and they can just look at you, then you are wondering ‘am I doing the right thing?’ ”

Discussion

The theme and five sub-themes that emerged during this research are important for health professions educators to take note of. This research confirmed that participants experience anxiety during SBA, which leads to stress. The sub-themes that were identified are that: the academic impact of the simulation assessment drives anxiety; waiting in a common area causes anxiety to build; a fear of scrutiny exists; lack of simulation fidelity and technical issues cause anxiety; and comparing their actions to their peers’ causes self-doubt and anxiety.

Although Stein found results that indicated that some students with high levels of anxiety performed well in SBAs (Stein, 2022), not all of these contributors to stress and anxiety are factors that educators want their students to experience, since it is generally accepted that anxiety negatively impacts performance (Al-Ghareeb et al., 2019). As an example, an educator would never choose for technical issues with the mannequin to occur during an SBA.

The authors grouped technical issues with mannequins and lack of fidelity in the sub-theme that emerged. Often, participants mentioned that fidelity of the simulation was limited by the fact that mannequin malfunction occurred. Participants stated that, in a real patient, functions such as lung sounds cannot simply stop working. Participants in this study also mentioned that low-fidelity SBAs caused stress because they required that the student asks more questions regarding aspects that would be obvious in a real patient, for example, “is the patient sweating?” or “is the patient cool to touch?”. The participants argued that this increased the number of aspects which they needed to concentrate on, thus increasing their stress levels. These findings echoed previous results found in ECP and paramedic students. The way in which low-fidelity simulation requires the student to use their imagination can also be stressful for students (Petejova & Martinek, 2014; Campbell, Labuschagne & Bezuidenhout, 2018; Slabber & Henrico, 2022; Sobuwa, 2023).

Fidelity is an interesting concept in how it pertains to stress and anxiety. Although high-fidelity simulation is often touted as “better”, SBAs with higher fidelity may increase the cognitive interference experienced by the student (Carey & Rossler, 2022). An example of such is that a simulated ICU case may have many sounds (ventilator, alarms, etc.) and visual cues that simulate the ICU environment. Although all these sounds increase fidelity, they may also induce stress and subsequently anxiety in the student (Carey & Rossler, 2022).

Prior to the SBA, students at UJ are kept in a common waiting area, so that the assessment scenario is kept secret from those students who have not completed the scenario yet. This study found that students experience stress whilst in the common waiting area, which causes their anxiety prior to the SBA to build. This is not the first time that this is documented. Slabber and Henrico (2022) found that students colloquially called the waiting room a “holding cell” due to the stress that it induces. Participants in this study discussed that waiting in this common area led to students pre-empting the clinical scenario and mulling over the potential treatment strategies that they may be required to demonstrate. This causes anxiety for some students, particularly if they feel inadequately prepared for the SBA. There is perhaps also an element of stress that is induced by the student comparing

their knowledge to that of their peers, in terms of what is being discussed in the waiting area prior to the assessment.

Mention was made, however, that this assessment stress can be reduced by being adequately prepared for the assessment and having practised in the simulation laboratory prior to the SBA. This was the same finding as that of Murugavadigal et al., who found that exposure to more high-fidelity patient simulations decreased students' stress and improved learning outcomes (Murugavadigal et al., 2020).

Comparing oneself to one's peers is a natural human action, in which students also participate. This research found that students suffered from anxiety that stemmed from self-doubt. This was precipitated by talking to their peers after an SBA and comparing the clinical actions that they performed during the SBA. Sometimes this self-doubt is unfounded as the students may not know what the correct treatment regimen for the scenario was after the SBA. The doubt may in fact be driven by the students' naturally pessimistic and hyper-critical outlook. This may also be linked to the socio-evaluative stress experienced by students (Stein, 2022). In the case of discussing their actions after the SBA has taken place, the socio-evaluative stress comes from their actions being "evaluated" by their peers. The greatest source of socio-evaluative stress, however, is postulated to be the assessors during the assessment (Mathobela, Stein, Vincent-Lambert & Whitaker et al., 2024).

The presence of assessors in the room when the SBA takes place is a stressor that is well-described amongst emergency care students (Mills, Carter, Rudd, Claxton & O'Brien, 2016; Campbell et al., 2018; Slabber & Henrico, 2022). Mills et al. describe how objective stress tests (salivary cortisol and heart rate) indicated higher stress levels in those students who had three other people in the room whilst they performed an SBA, versus those students who were in the room with only one other person (Mills et al., 2016). This study found similar results to Slabber and Henrico in 2022, where participants said that being watched by assessors was stressful. Interestingly, in this study one participant mentioned that when assessors did not show facial expressions (described by the participant as "poker faces"), that was stressful, whereas another participant mentioned how stressful it was to see facial expressions that were not neutral. In either case, a fear of scrutiny existed amongst the students, and part of this fear is that those assessors will allocate a "fail" result to the student's scenario, thus causing an academic impact. Campbell et al. (2018) and Sobuwa (2023) also identified the same stressor, with participants in the study by Campbell et al. (2018) mentioning that sometimes up to seven or eight different people are in the room whilst the

assessment takes place (Campbell et al., 2018; Sobuwa, 2023). Interestingly, the study by Mathobela et al. found that when the assessors were not visible to the students (i.e., were watching from another room), their physiological stress markers were actually higher than those students who had assessors with them in the room during an SBA (Mathobela et al., 2024).

The students in this study mentioned that the academic impact of the assessment was a potent stressor. This is not new information. As educators we know that assessment is stressful for students, particularly if the assessment has a significant academic impact. In the case of this study, the participants are enrolled in a degree programme which uses continuous evaluation strategies for most modules instead of a final examination. Even in a continuous evaluation structure, there will always be assessments that contribute significantly to the year mark of the student. In the case of ECP students at this university, there are also some SBAs which must be passed to pass the module (e.g., intensive and specialised care simulations or rapid sequence intubation simulations). Participants felt that the greater the percentage weighting (and thus the academic impact of the SBA), the more stressful the SBA was. This is neither new, nor is it something that educators can get away from, because in a degree where assessment forms part of determining competence, assessment will always have an impact on module success.

This university uses the SATLAB tool to generate the marks that the students obtain for the simulation assessment. This tool uses a weighted matrix, where each outcome in the simulation is weighted a certain percentage, to a total of 100% (e.g., history taking 15%; physical assessment 15%; pharmacological management of the emergency 70%) (Makkink & Vincent-Lambert, 2020). The student can score negative marks when the SATLAB tool is used, if they perform an action that can potentially cause minor or major harm to the simulated patient. This notion serves to teach the student that the incorrect clinical decision can have catastrophic effects for the patient (Makkink & Vincent-Lambert, 2020). When the student scores negative marks for an outcome, it may cause them to obtain an overall “fail” result. The participants in this study mentioned that this possibility of being awarded negative marks caused significant stress for them.

The real question is, though, how much stress should SBAs induce? Particularly for ECP students who will encounter stressful clinical cases when they graduate and enter unsupervised clinical practice. Baker, Bhalla, Doleman, Yarnold, Simons, Lund and Williams (2017) found that simulated cases were unable to replicate the physiological stress response elicited when trainees were required to perform a technical clinical procedure on real patients. Simply put, real clinical cases were more

stressful than simulated clinical cases (Baker et al., 2017). Similarly, Chang et al. discovered that physiological stress parameters measured higher in clinicians who were exposed to real emergency patients, as opposed to simulated patients (Chang et al., 2019). Oriot et al. also found that simulated cases did not match the stress induced by needing to treat a real patient in an emergency setting (Oriot et al., 2021). Anecdotally, we have often overheard students saying that SBAs are much more stressful than treating real patients. The reason for this is most likely because, as students, they will never practice unsupervised in a real emergency setting. They are also not the ones who hold the clinical responsibility for the patient's wellbeing. Further to this, when working under supervision, the student has one or more supervisors and possibly even a clinical practice partner to request assistance from when making clinical decisions.

When the stress induced by the SBA is moderate, the SBA serves to challenge the student as opposed to the student perceiving the SBA as a threat (Bong et al., 2016). When the stress induced by the SBA is excessive, cognitive overload occurs and performance is hampered (Bong et al., 2016). The balance that we strive to find as educators is a level of stress induced by SBAs which adequately prepares our students for real clinical experiences when they graduate. We also need to ensure, however, that it is not so stressful that it hampers the students in their ability to create meaningful learning experiences. This may mean that as educators, we need to investigate strategies that reduce the stress induced by SBAs, as was found by Ignacio et al. (2016). A simulation assessment is not only an opportunity for Faculty to assess the student, but also a learning opportunity. When that learning opportunity is tainted with stress and anxiety, there is a chance that learning is ineffective.

Conclusion

This research has shed light on the contributors to stress and anxiety during SBAs. There are some contributors that are difficult to get away from, that are simply part of the nature of assessment, such as the academic impact that the assessment may have, and the student's fear of failing the academic year; or the student comparing their actions to those of their peers. There are, however, other contributors to stress and anxiety that can possibly be changed, such as: when students wait together in one room prior to the start of the assessment; low levels of fidelity, which makes students have to concentrate on using their imagination to immerse themselves in the simulation; and being in a room with multiple assessors, which causes a fear of scrutiny. We recommend exploring an alternative to keeping students waiting together prior to the simulation. It may be possible to keep the students after their SBA so that they do not divulge details of the assessment to

the students who have yet to undertake the assessment. We further recommend limiting the number of people in the room during the SBA to a minimum to decrease socio-evaluative stress. Improving fidelity can assist in limiting student stress. Simple moulage may be helpful in providing visual cues that improve fidelity. Educators can use this information to create a setting which limits the stress and anxiety induced by SBAs.

Limitations

This study only sampled students from one programme at one university. This may mean that the findings are not necessarily pertinent to students from other institutions where SBAs are structured differently. SMD is a novice researcher and as such his interview skills were limited, thus the depth of the interviews may have been limited. This pilot study supports a larger, multi-institutional or longitudinal follow-up study that explores the issues around stress and anxiety in SBAs amongst students more deeply.

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