

Article

# Perceived Benefits of a Standardized Patient Simulation in Pre-Placement Dietetic Students

Hattie H. Wright \*, Judi Cameron, Tania Wiesmayr-Freeman and Libby Swanepoel 

School of Health and Sport Sciences, University of the Sunshine Coast, Sunshine Coast, Queensland 4556, Australia; jcamero3@usc.edu.au (J.C.); twiesmay@usc.edu.au (T.W.-F.); lswanepo@usc.edu.au (L.S.)

\* Correspondence: hwright@usc.edu.au; Tel.: +61-7-5459-4775

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**Abstract:** The purpose of this study was to evaluate the effect of a simulation-based learning (SBL) experience on perceived confidence in monitoring and evaluation, as part of the delivery of nutrition care of pre-placement dietetic students, and to describe their perceived value of the learning experience post-placement. A mixed method explanatory sequential study design was used. A confidence appraisal scale was developed and completed by students before ( $n = 37$ ) and after ( $n = 33$ ) a low fidelity simulation using a volunteer patient in an acute care setting. Two semi-structured focus group discussions with post-placement students ( $n = 17$ ) were thematically analysed, grounded in phenomenology. Overall perceived confidence in monitoring and evaluating, as part of nutrition care, improved after the simulation [pre-SBL: 74 (62–83) vs. post-SBL: 89 (81–98.5),  $p = 0.00$ ]. Two factors emerged to modulate confidence, namely (i) structure and (ii) authentic learning. Structure in turn was modulated by two key factors; safety and process. A low fidelity simulation using a standardised patient can improve students' perceived confidence in monitoring and evaluation, and a well-structured authentic learning experience was valued and positively perceived by most dietetic students.

**Keywords:** simulation-based learning; dietetic education; simulated patient; confidence; nutrition care

## 1. Introduction

Simulation-based learning (SBL) is recognised as a safe, authentic, experiential learning experience in healthcare education and has been used to develop or enhance a variety of skills in both students and clinicians [1]. Skill development includes discipline specific skills and procedures as well as generic skills such as communication, critical thinking, and clinical reasoning skills [1]. It provides the opportunity to bridge the theory to practice nexus delivering better prepared students entering placements or the workforce [2]. SBL forms are an integral part of medicine and nursing programs due to the nature of skill development required. Traditionally, SBL is not included in all dietetic programs due to lack of resources to develop high quality, realistic simulation scenarios, as well as access to simulation laboratories, and skilled staff to implement SBL [3]. The use of simulated patients in Objective Structured Clinical Examinations (OSCE) have and still is being used in some dietetic programs to assess dietetic skills [4–6] with positive feedback from students as an effective and positive learning experience [5,7,8]. The use of different types of SBL, apart from OSCEs, in dietetic education is emerging [3], with evidence supporting its success in the development of critical thinking and clinical reasoning skills [9], counselling skills [10,11], communication and behaviour change skills [12], increased self-efficacy in nutrition care [13], as well as competence in communication and nutrition care [14]. Despite the evidence that simulation improves various dietetic skills, there is paucity in the literature on its perceived value by dietetic students and their view on how simulation supports their

learning [7,15,16]. Insight into the perceived value of SBL by dietetic students may prove useful for dietetic educators when considering how and when to embed SBL in curricula.

To gain a better understanding of the value of SBL from a student perspective, the purpose of this study was to (i) evaluate the effect of a SBL experience on dietetic students' perceived confidence in the monitoring and evaluation of a nutrition intervention in an acute care setting, and (ii) explore their perceptions on how SBL influenced their confidence in providing nutrition care prior to clinical placement. It was hypothesized that a SBL experience will increase preclinical students' perceived confidence in monitoring and evaluating an intervention plan in an acute care setting, and that students will value the opportunity to experience SBL.

## 2. Materials and Methods

### 2.1. Study Design and Sampling

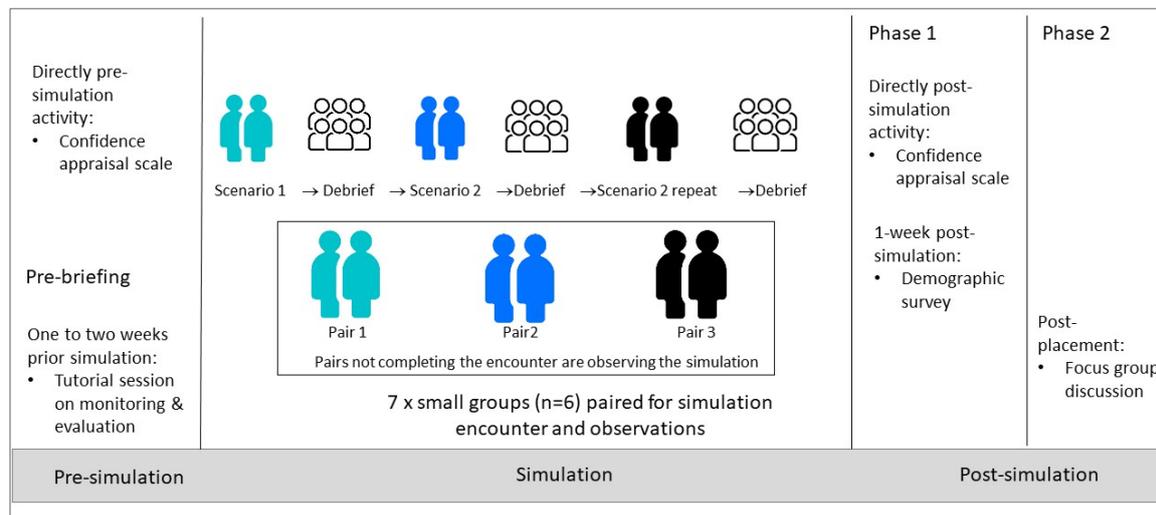
An explanatory sequential study design was used with a two-phase mixed methods approach [17]. The first phase of the study involved collection of quantitative data at two time points, namely directly before and after an acute care simulation using a demographic survey and confidence appraisal scale. In the second phase of the study, qualitative data was collected through focus group discussions 12 months after the simulation and following the completion of clinical placement.

The simulation was a non-assessable experiential learning activity in a Medical Nutrition Therapy (MNT) course in the third year of a 4-year undergraduate Bachelor of Dietetics program at the University of the Sunshine Coast, Australia. The course is a pre-capstone course that needs to be completed prior to MNT clinical placement (capstone course) in fourth year. All students enrolled into the course ( $n = 42$ ) in 2018 were eligible for inclusion into the study. Ethical approval was gained from the Research and Ethics committee of the University of the Sunshine Coast.

### 2.2. Simulation

An acute care simulation using simulated patients was developed and implemented according to best practice guidelines to ensure a safe and positive learning experience [18–20]. The learning objectives were to review and monitor a patient using an evidence-based model, apply problem solving skills in the provision of nutrition care, and communicate effectively with a patient in the acute care setting. The simulation consisted of two case scenarios (oncology and post gastro-intestinal surgery) where students were required to conduct a follow-up consultation for a patient in a simulated hospital setting. Students were provided with the case notes two weeks prior to and medical chart entries on the day of the simulation before they completed the simulation. During the encounter, students were expected to monitor and evaluate nutrition information and problem solve any nutrition-related issues raised by the patient. All students completed one encounter in a pair and observed two encounters over two sessions one week apart. Students were divided into small groups and completed the simulation in pairs (participating students), in total three student pairs ( $n = 6 \times 7$  groups) completed the simulation facilitated by one preceptor, see Figure 1. Whilst the first pair of participating students completed case scenario one, the remaining students (viewing students) observed the encounter via live streaming. Followed by the second pair of students completing case scenario two, and finally the last pair of students repeating case scenario two. This allowed the final pair of students to implement reflections of the previous pair of students in their encounter. Viewing students were tasked to observe aspects of the review and report back during the debrief session. The encounter lasted 10 min followed by a 20 min debrief session following three main phases: reaction, analysis, and summary [21]. Debriefing was facilitated through the preceptor (H.H.W. or T.W.-F.) who observed the encounter. The Plus-Delta framework was used in the debrief session [22]. Additionally, during the analysis phase, critical thinking and team learning were achieved through the use of circular and hypothetical questions posed to both participating and viewing students. An example of a circular question was 'Considering the patient's reported nutrition impact symptoms, what dietary strategies can be provided to alleviate

these?’ An example of a hypothetical question to stimulate clinical reasoning was ‘What if the patient keeps losing body weight despite your suggested changes to the diet and oral nutrition supplements?’ The simulation encounter was video recorded and available for participating students to view after the simulation to reflect on their own performance.



**Figure 1.** Graphical representation of the study design.

Volunteers acted as standardised patients and were instructed by the course coordinator on the sociodemographic characteristics, medical condition, and any presenting nutrition focused physical findings (e.g., nausea). Volunteers were briefed and orientated to the simulation room for 2 h and received written information on scenarios as well as scripts to potential questions two weeks before the simulation. Volunteers were instructed to answer any other questions not scripted in character.

### 2.3. Implementation

Curriculum integration of the simulation occurred at course level through consultation between the course coordinator, course moderator, clinical expert, and simulation technician. As students often do not appreciate the real-life nuances when evaluating and monitoring a nutrition intervention and this step requires problem solving and communication skills, as well as the ability to work in a multi-disciplinary team, a simulation was identified as the most suitable teaching strategy. The simulation was incorporated into the course by firstly providing students with a small group facilitator led tutorial session on monitoring and evaluation as part of the nutrition care process [23]. Students were provided with the case scenarios two weeks prior to the simulation. A pre-briefing session on simulation expectations was held and students were orientated to the simulation room to create a psychologically safe environment.

### 2.4. Data Collection and Analysis

#### 2.4.1. Phase One

A confidence appraisal scale (CAS) was developed based on Bandura’s guide [24] using a 10-point Likert scale (1 = can’t do at all; 10 = highly certain can do) to evaluate confidence in monitoring and evaluation before and after an acute care simulation incorporating critical thinking points as part of the nutrition care process [23]. Content validity was gained through inputs from accredited practising dietitians (n = 4) into the items of the inventory, and face validity was gained by input from fourth year students (n = 12) on clinical placement on understandability and ambiguity of items. Two items were reworded to reduce ambiguity. The final inventory consisted of 12 items. The inventory was completed as an in-class activity directly before the simulation and directly after the completion of the simulation

activity. The demographic survey included information on previous exposure to simulations or real-life observations, age, gender, who facilitated their debrief session, and open-ended question on what way they felt the simulation influenced their confidence in providing nutrition care. The survey was completed online within one week after completion of the simulation activity.

Data was analysed using the SPSS software package version 24.0 [25]. Continuous data were tested for normality, non-parametric variables are presented as median and interquartile ranges (25th; 75th percentile). Differences in confidence before and after the simulation were tested with Wilcoxon signed ranks test. Significance was set at  $p < 0.05$ . Responses to open-ended questions were organized by descriptive coding, reading through each response, and organizing into nodes. Common nodes were then grouped into overarching themes [26]. To reduce the risk of subjective bias, peer debriefing was used during the analysis of open-ended questions. Coding was completed independently by 'J.C.' and 'H.W.', compared, and minor differences were resolved through discussion before finalizing themes.

#### 2.4.2. Phase Two

Given the exploratory nature of the qualitative phase of this study, we employed a descriptive phenomenological methodology to describe and interpret student's perceptions of the benefits of simulation on their confidence in providing nutrition care in the acute care setting [27]. The phenomenological approach aims to unveil the basic structures of human existence by describing themes that comprise the experience being studied [28] (in this case, students experience taking part in the SBL). Recognising that SBL, albeit a small encounter, may still offer an immersive and embodied experience [29], the qualitative phase of this study was based on phenomenology, as it provided an appropriate theoretical base from which the meaning of the students' experience could be explored [30]. Twelve months after the simulation, students from the same cohort ( $n = 39$ ) were invited to take part in a focus group discussion to retrospectively explore the perceived benefits of the simulation after they completed their clinical placement. Focus groups were deemed the best method for data collection as they bring together a group of homogenous participants, which allowed us to gather subjective perspectives, whilst creating an opportunity for participants to stimulate each other [31]. To increase project rigour, focus groups were conducted by a single experienced facilitator (L.S.) who was independent to the students' learning and assessment at the time of the study.

In line with explanatory sequential design, quantitative findings from Phase 1 informed qualitative design in Phase 2 of the study [32]. Results from the 12-item Confidence Appraisal Scale used in Phase 1 directed focus group questions to further explore students' confidence at critical thinking points throughout the nutrition care process. The design of the semi-structured interview protocol (Table 1) was based on these Phase 1 results, in addition to the literature and inquiry logic, in order to meet the aims of the study. Two focus group discussions, involving 17 participants and lasting between 60–70 min, were conducted in a private room on the main university campus. Volunteer students provided verbal consent upon recruitment and prior focus group discussions.

Focus groups were audio taped, transcribed, and de-identified. In line with descriptive phenomenology, analysis of transcripts focused on identifying common patterns of meaning for participants [33], whereby coding centred around the experiences and perceptions of students to gain insight and understanding [34]. Analysis followed the four-step process described by Green et al., namely immersion, coding, categorising, and generation of themes [35]. Two of the authors (L.S. and H.H.W.) immersed themselves in the data, then conceptualised the data into similar codes. Codes were examined for repetition, resulting in the merging of multiple codes into broader categories. Connections between categories were examined, and explanations and interpretations of categories as themes was discussed and agreed upon by the authors in a process of peer debriefing [36]. The two authors whom conducted the analysis (L.S. and H.H.W.) recognise their own prior knowledge and assumptions, and the influence these may have on the research process. Specifically, as dietetic academics, our perspective is that exposing students to a variety of clinical experiences in a safe environment will improve student's readiness for placement. To improve trustworthiness of the data,

bracketing was employed, whereby the researchers attempted to remove themselves from their own personal experiences and biases throughout analysis and peer debriefing [37].

**Table 1.** Interview protocol for focus group discussion.

1.	Reflecting back on the simulation last year, what benefits did you gain from this learning experience?
a.	Probing question: How did the simulation affect your preparedness for clinical placement?
2.	Reflecting back on the simulation last year, in what way did the simulation influence your confidence in the provision of nutrition care before your clinical placement?
a.	Was there a particular area of the nutrition care process that you feel the simulation influenced your confidence in?
b.	Probing question: Can you tell me more?
3.	The simulation was structured in three phases, pre-briefing, simulation activity, and debriefing. How did this structure support your learning?
a.	(Paraphrase) Can you tell me more about that?
b.	What happened in each of these phases that supported your learning?

### 3. Results

Of the 42 students enrolled in the course, 39 students completed the simulation, of which 37 completed the pre-simulation confidence appraisal inventory and demographic survey. The post-simulation confidence appraisal inventory was completed by 33 students, resulting in an 11% drop-out rate. Two focus groups were conducted with a total of 17 participants. All students ( $n = 37$ ) were female with an average age of 24 (21–30) years. Overall, 70% ( $n = 26$ ) of students reported to have observed a registered dietitian monitor and evaluated progress of a real client/patient before the simulation, of which most were in the private practice setting (60%,  $n = 22/26$ ). Students that have previously observed a dietetic interview overall reported higher confidence levels in their ability to start a conversation with a patient [8 (6–9) vs. 7 (5–8), respectively,  $p = 0.043$ ].

#### 3.1. Perceived Confidence in Monitoring and Evaluation

Confidence levels in monitoring and evaluation is presented in Table 2, and overall, a 12% improvement in confidence in monitoring and evaluation was shown after the simulation. Self-reported confidence levels improved significantly in all items after the simulation apart from the ability to analyse change in anthropometric measurements and biomedical data.

**Table 2.** Perceived confidence in monitoring and evaluating a nutrition intervention before and after the simulation.

Statements	Pre-simulation <sup>1</sup> ( $n = 37$ )	Post-simulation <sup>1</sup> ( $n = 33$ )	$p^2$
Gather nutrition assessment information from a variety of sources	6 (5–7)	8 (7–9)	0.000
Identify relevant measures and/or data when I monitor and evaluate a patient's progress	5 (4.5–7)	7 (6–8)	0.000
Compare a patients' current findings (e.g., biochemical, anthropometric, dietary) with intervention goals	6 (4–7)	7 (6–8)	0.002
Evaluate whether the nutrition problem has changed	6 (5–7)	8 (6.5–8)	0.000
Check a patient's compliance with an intervention plan	6 (5.5–8)	8 (7–9)	0.000
Analyze change in a patient's anthropometric measurement/s	7 (5–8)	7 (6–8)	0.282
Analyze change in a patient's biomedical data	7 (5–8)	8 (6–8)	0.066
Analyze nutrition impact symptoms (e.g., nausea, vomiting, bowel movements)	7 (6–8)	8 (7–9)	0.000

Table 2. Cont.

Statements	Pre-simulation <sup>1</sup> (n = 37)	Post-simulation <sup>1</sup> (n = 33)	p <sup>2</sup>
Explain potential causes for variance from expected outcomes	5 (4–7)	7 (6–8)	0.000
Determine factors that may hinder a patient’s progress	6 (5–7)	7 (6–8)	0.000
Start a conversation with a patient	7 (6–8)	8 (7–9)	0.002
Negotiate a nutrition intervention with a patient or medical team member within a clinical setting	5 (4–6.5)	7 (7–8)	0.000
Total score †	74 (62–83)	89 (81–98.5)	0.000
Percentage total score	62 (52–69)	74 (68–82)	0.000

<sup>1</sup> Degree of confidence rated on a scale of 0 to 10, data presented as median and interquartile range (25th; 75th percentile). † Total score out of 120. <sup>2</sup> Wilcoxon signed ranks test, n = 33 (4 missing pairs).

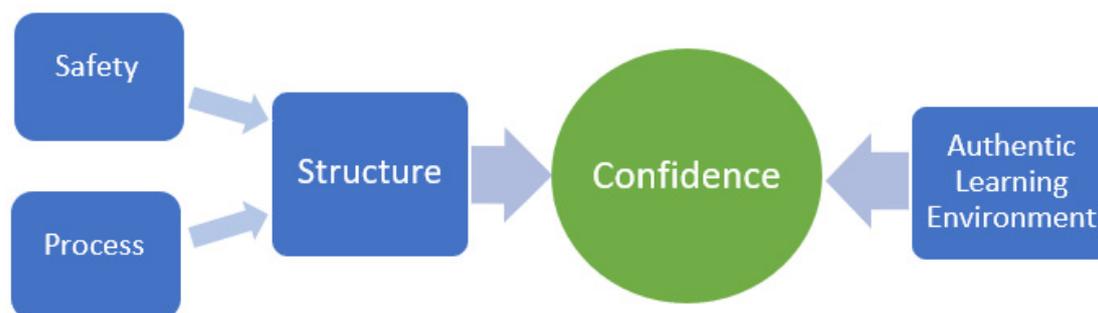
### 3.2. Perceptions on How Simulation Influenced Confidence

The open-ended questions on what way the simulation influenced students’ confidence in providing nutrition care were completed by 33 students. Content analysis identified five themes: (i) familiarisation, (ii) soft skill development, (iii) authentic learning environment, (iv) self-awareness, and (v) simulation process, summarised in Table 3. One student reported that more simulation opportunities are needed to increase confidence and that being observed by others and being recorded ‘negatively affected my confidence’ (Participant 17).

**Table 3.** Content analysis from open ended survey on the way simulation influenced students’ confidence.

Identified Theme, Times Identified	Theme Description	Example Quotes
Familiarization, n = 9	Students found familiarization to the hospital setting increased their confidence. Knowing what to expect in a clinical setting and how a typical session will run made them feel more comfortable	‘It oriented me to working with clients in an acute setting and has given me the confidence to do it in a real-world setting.’ (Participant 5). ‘Just getting that exposure to what’s expected of you. It helps build my confidence when I know a situation well from practice or experience.’ (Participant 3).
Skill development, n = 7	The simulation afforded the ability to interact with a patient, which provided the opportunity for communication, problem solving, information gathering, and soft skill development.	‘It increased my confidence in being able to enter a room and start up a conversation with a patient.’ (Participant 22). ‘Interacting with a patient and being able to come up with strategies on the spot.’ (Participant 28). ‘I was more aware of . . . how to behave in that circumstance.’ (Participant 14).
Authentic learning environment, n = 18	To be able to apply theory and have hands-on practice of a dietetic consultation helped students to contextualize their knowledge and increased their confidence	‘Physically completing something is completely different to on paper.’ (Participant 24). ‘[It] increased my confidence as I was able to put into practice what I learnt.’ (Participant 30).
Self-awareness, n = 7	Students became aware of their knowledge or lack of and areas they can improve on before placement.	‘[It] made me aware of what I know and what I can do better.’ (Participant 25). ‘I realized I knew more/more confident in my knowledge than I thought.’ (Participant 4).
Simulation process, n = 4	The way in which the simulation was structured and implemented was important to support learning. Students appreciated that they were not assessed and could observe and learn from each other.	‘[It was a] safe space to practice practical skills and see others doing the same. Good opportunity to discuss improvements or extra information in debrief session.’ (Participant 11). ‘Allowed you to make mistakes in a safe environment.’ (Participant 21).

There was common agreement amongst students who took part in the focus group discussions that the simulation experience increased their confidence prior to entering clinical placement. Students identified that confidence was modulated via two supporting factors that were core to the simulation experience; (i) structure, and (ii) authentic learning environment. Structure, in turn, was perceived to be modulated by two key factors; safety and process. These factors emerged through focus group discussions as key elements of the simulation experience that facilitated confidence building. The causal relationship between these factors, through which confidence is modulated, is illustrated in Figure 2. Direct quotes are provided below for insight into the student perspective.



**Figure 2.** Factors modulating confidence development through simulation.

Student focus group discussions were conducted to provide insight into how the simulation experience influenced their learning and to provide contextual understanding for the Phase 1 quantitative data. Confidence was central to all students' experience and was described in two ways. Firstly, students reported feeling more self-assured that they would be able to meet the competency requirements for the dietetic profession.

*"I made so many mistakes, but even though it wasn't that well done I found it rewarding to show myself that I can do it. And that got me excited, you know, when everything comes together in your brain from 3 years of study for the first time, and I thought 'I've got this'. That rewarding feeling motivates me to study. I got a sense that I can actually be useful." [Participant 7, FGD 1]*

*"It did increase your confidence as well because you saw the how everything fits together. Like that's where the bed chart lives and that's what it looks like, that increased my confidence too. Once you were on placement you remembered seeing things in simulation lab and you relate that memory to that situation which I think does calm you a little bit and increase your confidence because you've been there before." [Participant 1, FGD 1]*

Secondly, students felt inspired to work in their choice of career in the future. Students reflected on how feeling connected to the dietetic profession confirmed their career choice.

*"It made me think this is the right choice, this is where I belong. I got excited during it, but also afterwards. I realised this is huge, there's so much to learn, but it was a taste and I realised that I can do this." [Participant 10, FGD 1]*

The value of the simulation experience in building confidence and clarifying expectations for placement was clear to students, however many expressed a desire for ongoing, regular exposure to simulation in order to consolidate skill development and relieve anxiety.

*"It does solidify more what we actually do as a dietitian and I think it's something we should have done more of to actually practise those skills in real life examples." [Participant 4, FGD 2]*

*"It would be good to do more of it is because you're learning how to be physically with a patient, you're not even concentrating on what you're saying. You're thinking where do I stand? Am I an*

*appropriate space away? Am I doing too much with my hands, I dropped my pen what do I do?"* [Participant 3, FGD 1]

*"It helped me feel comfortable. The familiarity reduced the anxiety of the unknown, so then when I went onto placement, I felt much more comfortable that I can walk onto a ward and follow the right steps rather than it being a completely new environment."* [Participant 2, FGD 2]

The structure of the simulation experience emerged as a primary modulator of confidence development. Positive attributes of the structure that students identified were the defined process and safety. The process was divided into three stages (pre-briefing, simulation, debriefing), all of which students perceived to be beneficial to their confidence development. Having the choice to observe peers complete the simulation beforehand was particularly comforting for some students, as evidenced through the following quotes.

*"You also got to see how other people did things and see what works well and what parts you can take and put into practice yourself. You get taught one way, but then in reality in the simulation you can do it how you feel comfortable to you. Then watching other people, you can learn from them and use things that might work well for you as well."* [Participant 8, FGD 1]

*"Observing also contributes to that comfort. It's like watching your supervisor on placement, observing them and then having a go, watching your peers do it makes you realise that you can do it as well. It makes it feel simpler and more doable."* [Participant 7, FGD 1]

The third stage of the experience, the post-simulation debriefing, offered students an opportunity to reflect independently before receiving feedback from the preceptor. This opportunity empowered students to apply reflexivity, as demonstrated through the following quote:

*"I found the post very helpful to start that reflective process that we need for medical nutrition therapy. It drew out my own feelings with how I went, what I can improve on and what I did well. That self-reflection was helpful, instead of just expecting feedback straight away."* [Participant 1, FGD 2]

Safety was perceived as an important advantage of the structure of the simulation experience. Students described a range of factors they perceived contributed to their sense of safety. These included (i) the formative nature of the simulation meant that students didn't feel the added pressure they associate with assessment; (ii) undertaking the simulation with a known peer added a familiar sense of security to the experience; and (iii) the clear structured process provided a sense of familiarity to an unfamiliar environment. This theme is illustrated through the following quotes, where students reflect on how the structure of the experience provided a safe environment, giving them added security and confidence prior to placement.

*"You realised, oh ok that's what it's going to be like on placement. You felt safe because you weren't being assessed, but you still had all your classmates watching you, so it was like you are getting assessed because you're being observed and eyes are on you for the majority of the time, which is just like placement. I think that was really valuable because you realised oh ok this is what it's going to feel like, and it's ok."* [Participant 1, FGD 1]

*"The supportive aspect of it, it was being recorded and you wore a microphone and if you did need to wave your flag and say 'help' it would be ok, but I was able to get through it and it was nice to show myself that I was able to get through that situation. I found it to be really reassuring, as opposed to if it was being assessed it would have been more stressful."* [Participant 8, FGD 1]

The authentic learning experience was viewed by almost all students as overwhelmingly positive. Students reflected on many aspects of the learning environment, such as the smells, noises, visual

observations of the hospital ward, and unpredictable patient behaviour. Students talked about the ‘hints and clues’ they could pick up from the environment, before even speaking with the patient, such as a pile of empty oral supplements on the table, or a catheter bag by the bedside. The ‘real’ environment was a welcome experience for all students as they reflected on feelings of empowerment that came from translating years of classroom work into real world practice.

*“I think the fact that it was a simulation patient room in its natural environment, so we followed a real process. We walked in and washed our hands, introduced ourselves . . . the patient was lying in a bed, they had a tray next to them they had a mountain of nutritional supplements. It all gave a sense of realism to the experience. I found that really helpful.” [Participant 2, FGD 1]*

*“For me it was a real-life insight into what we would actually experience on placement. It was almost realistic of the type of situation you would encounter when on placement . . . it was really valuable because it confirmed that I’d made the right career choice.” [Participant 3, FGD 1]*

*“I think just because you’re in that real-life setting, you’re learning how to be physically with a patient, taking into account all the smells and noises. For me that was a big thing in the simulation, needing to navigate the physical space and figure out how to position myself.” [Participant 7, FGD 1]*

#### 4. Discussion

The main findings of this study were that a low fidelity simulation utilising simulated patients embedded in a dietetic program before placement increased dietetic students’ perceived confidence in monitoring and evaluation of a nutrition intervention in the acute care setting. The simulation experience was positively perceived by most students. There was convergence in the quantitative and qualitative data, highlighting that students’ confidence was positively influenced. Modulating factors to confidence were a safe learning environment, a well-structured simulation experience, and an authentic experience.

The value of experiential learning experiences such as simulation extends beyond the mastery of discipline-specific skills or achievement of competence. Experiential learning supports the translation of theory into practice, enhances understanding of course material, builds professional identity, and improves graduate attributes, thereby enhancing employability [38–40]. In the current study, students’ perceived confidence in monitoring and evaluation before the SBL experience were relatively high, which may be contributed to the tutorial provided on monitoring and evaluation before the simulation. In addition, most students reported that they have observed a dietitian conduct a follow-up consultation with a real client. Observing a task performed by a supervisor or peer has shown to increase confidence, as students can reflect on their observation and apply their newfound knowledge in future tasks [14,40]. Nevertheless, perceived confidence scores increased in all but one item after the simulation, highlighting the value of active participation and authentic learning experiences to further enhance student confidence in dietetic skills. A lack of increase in the perceived confidence to analyse change in anthropometric measurements in the current study is likely due to the simulation scenarios that lacked this aspect. Students reported to be more self-aware of their own knowledge and skills following the simulation, with some feeling more confident and others less. This is in accordance to others who reported increased self-efficacy in the nutrition care process in some dietetics students after SBL, whilst self-efficacy and confidence decreased in others, providing them with a more realistic view on their current knowledge and skills [13]. OSCEs have shown to be valuable learning opportunities to support skill development in dietetics students and identify struggling students that need further support prior to clinical placement [5,41]. In addition, encounters with simulated patients can be of particular benefit to borderline students prior to placement [42]. Our findings support these and expands on them, highlighting the perceived value of SBL by dietetic students which identified important modulators to enhance confidence before placement.

Overall, students valued the learning experience and structure was identified as an important modulator to enhance student confidence. This aligns with a recent systematic review on SBL in dietetic programs emphasizing the need for programmatic alignment to support student learning [43].

Setting students up to succeed with the necessary knowledge and relevant skills is viewed as best practice when embedding simulation in curricula [43]. Farahat and co-workers [7] explored nutrition students' perceptions on the educational value of a formative OSCE through focus group discussion. Students were enrolled in a variety of degrees and completed three OSCEs as part of their medical nutrition therapy course. One of the themes that emerged were curriculum considerations where students requested case information to be provided prior to the OSCE, as well as adequate preparation for the encounter. Not knowing what to expect and feeling unprepared made students feel anxious. In addition, students valued the OSCE to be before clinical placement [7]. These findings highlight the importance of programmatic alignment and pre-briefing, which is supported by our findings. We believe providing a thorough pre-briefing and tutorial on monitoring and evaluation before the simulation may have created a psychologically safe learning experience [19], contributing to the overall positive SBL experience reported by students in the current study. In addition, implementing the simulation before clinical placement was valued as it familiarised students to the clinical setting and clarified expectations on placement, which helped to reduce anxiety and thereby build their confidence.

Students reported that the formative nature of the simulation, as well as the safe learning experience with post-simulation debriefing, all contributed to a positive learning experience and increased their confidence. Since students in the current study only had the one simulation experience in their program, it was decided to have a formative learning experience in order to reduce anxiety and provide a space where they felt safe to make mistakes [8]. This was appreciated by students and played a key role in building their confidence. Formative simulations were shown to reduce anxiety and increase self-confidence related to clinical decision making in novice nursing students [2]. Anxiety is associated with reduced levels of confidence, competence, and performance in medical and nursing students, which can affect patient safety [2,44]. Further insight into the difference in dietetic students' learning experience between formative and summative SBL is needed to inform best practice when embedding SBL in curricula. Debriefing is considered an integral part of SBL in health profession education [45]. This was supported by the feedback from students in the current study, noting the value of educational feedback during debriefing to improve future performance. A systematic review on the effectiveness of simulation debriefing [45] found mixed results on the most effective debriefing approach utilised in medical and nursing students. However, the results did confirm the importance of debriefing per se, and significant improvements in learning outcomes were associated with a variety of debriefing strategies. Future studies on different debriefing approaches used with SBL in dietetic education is warranted. Having students complete the simulation in pairs was due to lack of resources and time to provide individual experiences. However, this format resulted in students feeling less anxious and more supported in an unknown and somewhat daunting task. Peer support is known to enhance learning [46], which was echoed by students in the current study. Furthermore, students were able to observe each other conduct their simulation and participate in post-simulation debriefing, which provided space for reflexivity and support situated knowledge translation to future tasks [47,48].

Limitations to this study include the use of a small convenience sample, a drop-out rate of 11% after the simulation, and the completion of phase 2 after completing placement, which may introduce bias to the results. It is acknowledged that increased confidence does not necessarily translate into improved skills or behaviour, future research is warranted to further explore these associations. It was not possible to include a control group as it was unethical due to strong evidence showing the benefit of SBL. Students completed the simulation in pairs, thus were not able to have an individual experience due to limited resourcing and timetable constraints. Volunteers acted as patients due to lack of access to trained standardised patients and funding to afford trained actors. Despite these limitations, students reported an increase in their perceived confidence, and they appreciated the fact they had a peer with them which made the experience less daunting and provided a safer learning experience.

## 5. Conclusions

To summarise, this study set out to evaluate the effect of a low fidelity SBL experience on the confidence of pre-placement dietetic students in monitoring and evaluation as part of nutrition care in the acute care setting. It was of interest to the authors to explore the perceived value of the simulation to students reflecting on the experience after completing their clinical placement. We were also interested in assessing whether the learnings gained from students warranted the resourcing put into the development and implementation of a one-off simulation-based experience. It can be concluded that a low fidelity SBL experience, using limited resources, was a worthwhile learning experience, as it increased perceived confidence in the delivery of nutrition care, was valued by students, and provided a rich learning experience extending beyond paper-based cases and observation, thereby better preparing students for clinical placement. This is an important outcome, as increased confidence is associated with increased self-efficacy, which can translate into performance on clinical placement and ultimately influence patient-centred care [47]. In addition, our findings provide insight into key modulators to enhance confidence in dietetic students when embedding SBL experiences in curriculum. Given the cost and resourcing required to implement SBL [4,42], future research on the frequency of SBL and its impact on confidence as well as competence development is warranted to shed further light on curriculum design for educators.

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